

SME Too:

How can HEIs and SMEs interact more effectively?

A student-led project from the University of Warwick

Nicholas Tipple, Michael Cumming, Alex Mockridge,
Oliver Newth, Sze-Yin Tan

July 2012



THE UNIVERSITY OF
WARWICK



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Supported by National HE STEM Programme (Midlands and East Anglia)
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Abstract

A team of four undergraduate researchers investigated interactions between higher education institutions (HEIs) and small and medium-sized enterprises (SMEs) in the subjects of science, technology, engineering and mathematics (STEM). Led by a project research officer from the Institute for Advanced Teaching and Learning at the University of Warwick, the researchers surveyed and interviewed students, academics and SMEs.

The key themes that emerged from the research were:

- The careers industry;
- Do SMEs understand what graduates want and what they can offer?
- What do students know about SMEs?
- The potential for increasing interactions.

Six recommendations that came from the research were:

1. A single internet site/portal is required for SMEs to distribute opportunities around HEIs.
2. Students should set up networking events for SMEs.
3. Where applicable, SMEs should advertise the potential for career progression in their graduate positions.
4. Universities should ensure that information about company-funded STEM research is available to students.
5. University STEM departments should encourage more guest lectures.
6. HEIs to further promote student and graduate employment in SMEs.

74%

of STEM students do not know about
company funded research taking place at Warwick

Career progression

The most important factor for STEM students when choosing an employer, followed by job security, research and financial reward.

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1. Methodology

Aims and objectives

Broadly, the scope of the project was to investigate interactions between small and medium-sized enterprises (SMEs) and higher education institutions (HEIs); to review current practice, and to investigate perceived opportunities for and barriers to increased mutual engagement.

The project aims outlined in the funding application were:

1. To research current practice on how SMEs and HEIs engage, using Midlands universities, SMEs, intermediary partners such as councils, and industrial bodies such as Chambers of Commerce;
2. To increase the links between the University of Warwick and local SMEs at an institutional and academic departmental level;
3. To increase opportunities for the University of Warwick and local SMEs to work together on quantifiable outcomes such as student projects, research collaborations, student placements, guest lectures, and participation in industry boards;
4. To describe how the links between SMEs and HEIs can be made and maintained to the mutual benefit of both parties, and also how to include interested intermediary partners who have targets for encouraging inward investment to their local area;
5. To research the current practice and potential for local government to act as an intermediary between SMEs and HEIs;
6. To disseminate the results of the work to the HE sector, to SMEs, local, regional and national government, and other organisations such as the CBI, CIHE, and learned societies.

Assembling the team

Nicholas Tipple was appointed as project research officer while in his second year of a part-time MA in Writing course at the University of Warwick. He was studying at Warwick for a second time, after graduating with an MChem (Hons) Chemistry degree in 1999. Between these two degrees, he worked in project management on technical and commercial projects, including seven years at the nuclear reprocessing site at Sellafield, Cumbria.

Four undergraduate researchers were recruited from STEM courses during the summer break in readiness for the 2011/12 academic year. Michael Cumming was a third-year Engineering student; Alex Mockridge was in his fourth year of Mathematics, Operational Research, Statistics and Economics; Oliver Newth was also a third-year Engineer; and Sze-Yin Tan was a third-year Chemistry student. A fifth student was recruited but decided not to pursue the project after its first meeting.

First step: Discussing the topic

The key to this study was that the student researchers would decide its direction. The aim of the first meeting was therefore to consider HEI and SME interactions from the perspectives of the research team. This resulted in a series of questions that the team used to form the basis of their research. Examples of the questions included:

- How do students and SMEs interact? Where do students go to find opportunities with SMEs? Where do SMEs go to find opportunities with students?
- Do students and HEIs understand the value of SME interactions?
- How easy is it for SMEs to interact with HEIs? Are the cultures of HEIs and SMEs compatible?
- What can HEIs and SMEs gain through interactions?
- Is graduate recruitment at HEIs geared towards helping large corporations rather than SMEs?
- To what extent do companies impact on HEI curricula in STEM subjects?
- How do companies perceive students (large corporations and SMEs)?
- How many students own/manage SMEs? How many staff own/manage SMEs?

Desktop Study

The team began to develop a methodology for exploring the key questions and each student undertook a desktop study to provide a context for the research. Aspects investigated included: how HEIs engaged with SMEs; how the government funded SME and HEI interactions; which organisations facilitated SME and HEI interactions in the Midlands region. Trade institutions that represented SMEs were also investigated (see Appendix I).

The University of Warwick Strategy

Interactions with SMEs potentially impact two of the five goals outlined in the University of Warwick's University Strategy.¹ These include:

Goal 2: To ensure a high-quality and distinctive Warwick student experience.

Objective 1. Constant innovation in the undergraduate curriculum.

- Offer all undergraduate students the opportunity to work on an extended project or piece of research in order to produce and nurture the most able academic staff of tomorrow.

¹ *University Strategy*, University of Warwick, March 2011 <www2.warwick.ac.uk/institute/strategy/> [Accessed 30 May 2012].

Objective 2. Prepare students for their lives beyond Warwick.

- Make employability skills and entrepreneurship a core feature of the student experience.
- Encourage and fully accredit work experience and extended placements with employers.
- Introduce new support and incentives for students taking intercalated years.

Goal 4: To further strengthen our sense of community and increase engagement with our stakeholders in order to enhance the University's reputation in the UK and overseas.

Objective 4. Increased engagement with business will be a major focus for the University.

- Build on excellent work already being undertaken.
- Support the Coventry and Warwickshire Local Enterprise Partnership.
- Take a new, more cohesive approach to business engagement, working across the University to enhance the support we provide to business, public sector bodies and third sector organisations.

The goals and objectives applicable to the project are referenced throughout the report. While taking part in the study, the undergraduate researchers were satisfying Goal 2, Objective 1.

The Wilson Review

The findings of the government white paper produced by Prof Sir Tim Wilson² dovetail with this research. The key points relevant to this research include:

- 'Universities are an integral part of the supply chain to business, a supply chain that has the capability to support business health and therefore economic prosperity.' (section 1.2, paragraph 2);
- It is anticipated that employability will become more important to students and more students will be considering their careers as they enter HEIs (section 6.2);
- The expectations of all graduates don't currently match the realities of the jobs market. With applications to large companies being 'disproportionately popular' among graduates, the report recommends that HEIs should reflect on how student perceptions of SMEs can be improved (section 6.4, paragraph 3);
- The majority of graduates go into their first jobs in the SME sector (section 6.4.3);
- 'Few SMEs have the necessary infrastructure [to interact with HEIs] without support' and

business organisations such as Local Enterprise Partnerships (LEPs) could provide that support (section 7.2, paragraph 2);

- Connectivity – 'the first contact and creating awareness' – is a challenge for HEI and SME interactions (section 7.2.1, paragraph 3).

2 Wilson DL Prof Sir Tim, *A Review of Business-University Collaboration*, (2012) <www.wilsonreview.co.uk/> [Accessed 14 May 2012].

2. Gathering data

The team agreed that the research period would last for the autumn and spring terms as the summer term was dominated by exams; the majority of the research would therefore take place from October 2011 to the end of March 2012. The team decided that opinions were required from students, academics and SMEs, and these would be obtained through surveys. As themes emerged, interviews would be used to investigate specific topics in more depth.

Intermediaries were considered to be stakeholders in HEI and SME interactions who were not students, SMEs or academics. It was decided that intermediaries would be used at the end of the study to triangulate findings and recommendations.

Online surveys were clearly the most practical way of surveying target groups. Questions could be distributed to large numbers of people very quickly and easily; the survey software would manage the data, and present results in many different forms. One undergraduate researcher – Oliver Newth – was proficient in a number of websites and directed the team to Survey Gizmo as it provided a free service to students and offered features that would be useful for questions the team wanted to ask.

The team had some experience of surveys, although

background reading was required to develop and clarify a number of aspects, such as sample size and interview technique. Before the surveys were finalised, they were peer reviewed by an academic in the Department of Psychology and tested on a dozen STEM students. Some questions were qualitative, while others were quantitative. The time it took to complete all of the surveys was kept strictly below 15 minutes.

The student survey was circulated through each of the STEM departments of the University of Warwick via each department's academic student office. The survey was circulated at intervals of approximately four weeks throughout the research period, with little additional publicity. Some departments gave permission to distribute the survey directly to their students; others were reluctant to keep sending mass emails.

In all three of the surveys, respondents were asked if they would like to participate further in the research. For the student survey, two prize draws were made for a popular online retailer (five £20 vouchers for each draw) and students could register for the draw without being contacted for further research. Registering email addresses for the prize draw became additionally useful for filtering out duplicate responses.

The SME survey proved to be the most problematic; it was incentivised with a £50 voucher half-way through the research period due to the lack of responses. The team asked numerous intermediaries to circulate the survey and, in four months, the survey was distributed to between 4000 and 6000 SMEs. In total, 189 responses were recorded, of which 62 were STEM SMEs. The most successful way of engaging SMEs with the survey as part of email distribution, was when a link was emailed directly to a company. If the survey was part of a newsletter, or publicised on a website, very few companies appeared to complete the survey as a result. The most effective distributors appeared to be Coventry City Council, science parks associated with an HEI (i.e. Warwick and Coventry), and a network of SMEs associated with the University of Warwick's Centre for Student Careers and Skills. Researchers sent the survey directly to SMEs in science parks if permission was first obtained by the park management.

It became clear that the survey was one form of interaction between SMEs and HEIs, and most businesses did not have time or inclination to complete the survey as they could not see a benefit to their business. The project team concluded that this reflected the attitudes of the majority of SMEs towards HEI interactions. With this in mind, distribution of the survey was focussed on SMEs who had already interacted with HEIs; partly because these SMEs were more likely to be amenable to completing the survey, but also

because SMEs who had previously interacted with HEIs were more likely to suggest ways of improving interactions.

The team thought that the number of SME respondents was low compared to the amount of time devoted to circulating the survey. Some learning points that arose during the survey include:

Ensure the survey was emailed directly to SMEs and not as part of a newsletter;

Telephone SMEs and ask them to complete the survey over the phone;

Take the survey to SMEs – to science parks or to networking events – perhaps with the survey on tablet computers.

The student survey

722 STEM students from the University of Warwick responded to the student survey, which represented a sample size of 13.7 per cent (see Appendix 2). Respondents were from all of the university's STEM subjects (Fig. 1) and all year groups from second-year undergraduate to PhD postgraduate (Fig. 2). Undergraduate first years were excluded from the survey as, although the team thought they were most likely to complete the survey, they were least likely to have had any interactions with SMEs. The total number of undergraduates was 550 (a sample size of 20.8 per cent), while 172 postgraduates responded (a 6.5 per cent sample). A cross-check was made between undergraduate and postgraduate answers and no discernible difference was found.

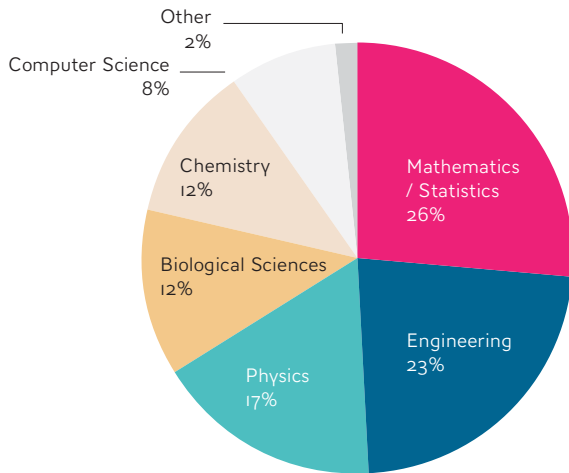


Figure 1. Distribution of student respondents by subject.

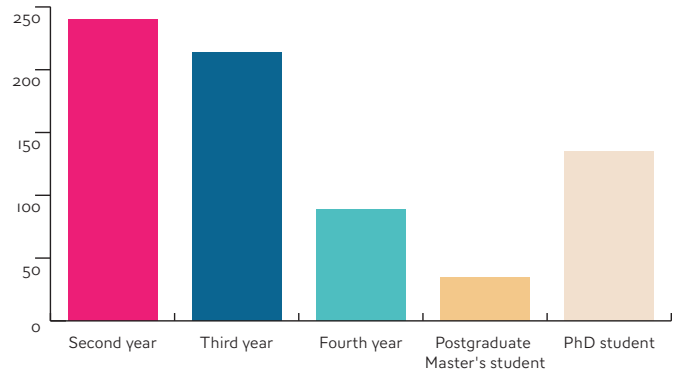


Figure 2. Distribution of student respondents by year group.

Interviews with students

Students were selected for interview while responses were still being collected from the online student survey. From approximately 530 survey respondents, all of the students offering to be interviewed were contacted and a timetable for interviews was filled on a first-come-first-served basis. The aims of the interviews were to obtain detailed thoughts against some of the emerging themes of the research. Fixed questions were asked for about fifteen minutes of the interview; then, if time was remaining in the 20-minute slots, the interviewer asked unstructured questions worded at the interviewer's discretion. These were based on information the interviewee had provided to a previous question.

Of the 17 self-selected student interviewees, four were postgraduates (two masters and two PhD) and, of the thirteen undergraduates, there was a

roughly even split between years 2, 3 and 4. Nine of the students were from Engineering.

The SME survey

62 STEM SMEs completed the survey, most of them with fewer than 30 employees (Fig. 3), predominantly from the Technology sector (Fig. 4) and in the West Midlands region (Fig. 5). The sample was not representative of any sector or region (there are thousands of SMEs in the Midlands alone).

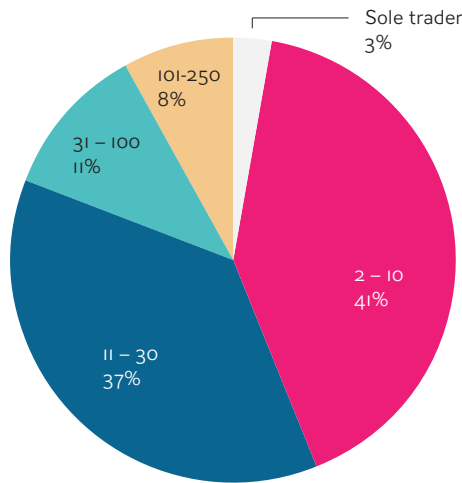


Figure 3. The sizes of SMEs that completed the online survey by number of employees.

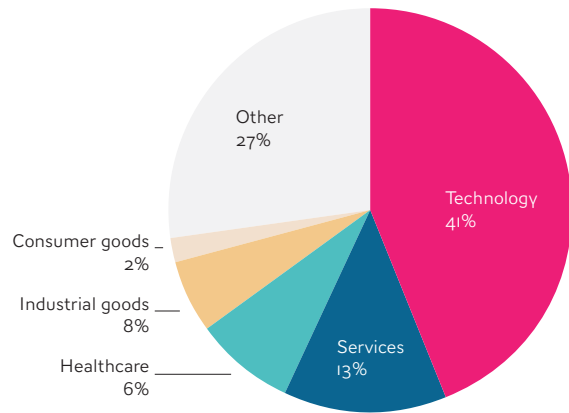


Figure 4. The sector of SMEs that completed the online survey.

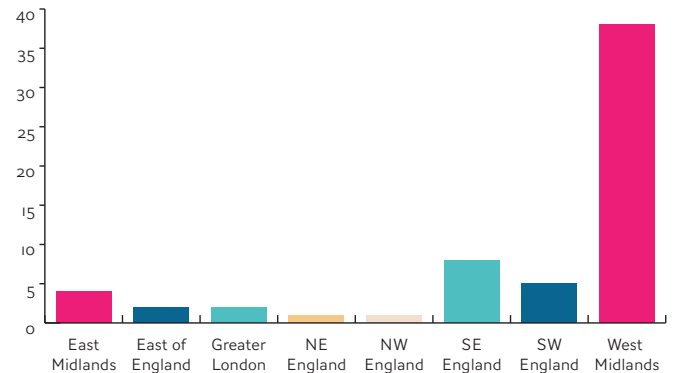


Figure 5. The region of the SMEs that completed the online survey

Interviews with SMEs

The interviews with SMEs were carried out to obtain further information against themes that emerged during the online survey. As the SME survey was not statistically representative of any group, the interview questions were not as rigid as those for the student interviews and were based on answers each SME had given in the online survey. In all, ten STEM SMEs were interviewed.

When setting up the interviews, the team found that emailed requests rarely brought a response from SMEs. Telephone calls – even if they had to be repeated – were far more effective.

The academics' survey

The academics' survey was distributed after the student and SME surveys, and the key themes of the research had already begun to emerge. Reviewing the research methodology in light of the themes, the team decided to concentrate their efforts on interactions between SMEs and students. The academics' survey was therefore only circulated once, which precipitated 12 responses: four each from Engineering and Physics, and two each from Mathematics and Chemistry.

Interviews with academics

Six of the 12 academic staff who completed the online survey were interviewed.

Interviews with intermediaries

Intermediaries were considered to be groups who were not students, SMEs or academics, yet still stakeholders in HEI and SME interactions. They included representatives from universities who facilitate SME and HEI interactions, such as business link departments or careers services; Coventry City Council and Warwick District Council; science park representatives, and external recruitment consultancies. A couple of intermediaries – i.e. members of staff from Warwick's central functions – were interviewed at the beginning of the research to help the team contextualise their research. Most of the intermediaries were used to triangulate the data.

Interviews to triangulate findings

Findings and recommendations were initially compiled from the student survey data, as it was obtained from a statistically valid sample. Points from the other information sources were then added, i.e. from the academic and SME survey data, and from the interviews with students, academics and SMEs. The initial findings and recommendations were then presented to some of the parties involved in the research: two academics, a university careers service, an independent careers consultancy, Coventry City and Warwick District councils, a STEM SME and a university science park. By gauging the opinions of these parties, the findings were refined for this report.

Reassuringly, all of the parties agreed with all of the recommendations. Few prompts were needed to facilitate discussions, as everybody had opinions on the research. The unanimous validation of the recommendations was significant to the triangulation process, although of equal importance were the practical suggestions that could potentially facilitate their implementation.

Background data relating to the study

It is important to bear in mind that every HEI is different and has unique features. Since our research is based at the University of Warwick, it has its own unique dynamic and the Midlands has a strong manufacturing and mechanical engineering industry. Since we want our research to be applicable on a wide scale, they do not focus specifically on the university or the manufacturing industry.

The Engineering department at the University of Warwick is large (see Appendix 2). After Mathematics/Statistics, it was the department from which we received the most student responses to our survey. When we analysed the survey results, Engineering students had the most awareness about SMEs and were the most likely to have interacted with SMEs out of all the STEM departments. It is important to bear this in mind when looking at the results from the student survey, although the results are not so different from other STEM subject students to warrant separate treatment.

We also need to consider the context of STEM students in the university where our research was based, and how they compare to STEM students nationally. There is a lot of data available on university students from the Higher Education Statistics Agency (HESA), some of which is freely available online. We used this data to get an idea of how many of STEM graduates stay in STEM-related

sectors.

If we look at graduates from the University of Warwick, of those who have done their first degree in STEM and are going into employment, Computer Science graduates are the most likely to stay in STEM: 90 per cent go on to be information and communication technology professionals.³ The second most likely group to work in STEM are Engineering students, while Mathematics and Statistics students mainly go to work in business and finance or business and statistics professions.⁴ For these sectors it is not clear whether they should be classified as STEM or not. The least likely group of students to graduate and find a job in STEM are those in the physical sciences, where students are more likely to work in business and finance (14 per cent) than as science professionals (13 per cent).⁵ However, the reason for this could be that in these fields further study is important for continuing in STEM.

How does this compare to other universities? As a basis for comparison, we looked at Coventry University. The majority of Coventry's Computer

3 Unistats, *Download data extracts*, <unistats.direct.gov.uk/downloadSpreadsheet.do> spreadsheet for University of Warwick located at <downloads.unistats.com/currentYear/public/Unistats_10007163_10-6-2011.xls> [Accessed 30 May 2012] (worksheet JobType_7_1, cell E73).

4 *ibid.* (cells E53 and E54)

5 *ibid.* (cells E43 and E44)

Science graduates go into STEM, but the figure is less, at 30 per cent.⁶ The rest go into a variety of non-STEM professions. For Engineering and Technology, the picture is also similar, with the majority continuing in an engineering-related job.⁷ There are no mathematical sciences courses for comparison, but for physical sciences graduates going into work straight away, again the vast majority of graduates work in something unrelated to STEM: the most popular choices being elementary occupations, administration, sales and retail.⁸

The fact that the destinations of STEM graduates are broadly similar on a subject level between the two institutions is encouraging for the results from our student survey: it suggests they can be scaled to represent STEM students from other HEIs.

The key point from this background data is that the students currently most likely to continue in STEM appear to be Engineering and Computer Science students.

6 Unistats, *Download data extracts*, <unistats.direct.gov.uk/downloadSpreadsheet.do> spreadsheet for Coventry University located at <downloads.unistats.com/currentYear/public/Unistats_10001726_10-6-2011.xls> [Accessed 30 May 2012] (worksheet JobType_7_1, cell E94).

7 *ibid.* (cell E114)

8 *ibid.* (cell E74)

3. Research findings

Key Theme 1: The Careers Industry (Recommendations 1 and 2)

From the SME survey, the most common interaction SMEs had with HEIs was through employing someone who had been to an HEI, but the least common interaction was through a careers fair. When asked where they advertise opportunities for students and graduates (work placements, internships or graduate jobs), the most favoured place was to go directly to careers services. The next most popular places (in descending order) were online advertising, communicating through university departments, and posting on their own company website.

Research carried out in 2008 concluded that the most common method of finding a job amongst West Midlands graduates was scanning adverts in the media,⁹ with the use of recruitment agencies the next most common. Internet search was third with less than 20 per cent of students using it. In our study, the most commonly used medium students used when searching for an employment opportunity was an internet search. This represents

9 West Midlands Observatory, *Graduate retention attraction and employment study 2008*, (2008) <tinyurl.com/cd6nvl5> [Accessed on 9 May 2012] (p. 20).

a shift in student behaviour since the 2008 study. In the online survey, students then favoured browsing a company’s website, attending a careers fair and using the HEI’s careers service. The fifth most common was using existing contacts (Fig. 6). SMEs and careers services may be lagging behind the shift in culture of students, and further online methods could be exploited to reach students. Inevitably, some SMEs – particularly start-ups – won’t have company websites.

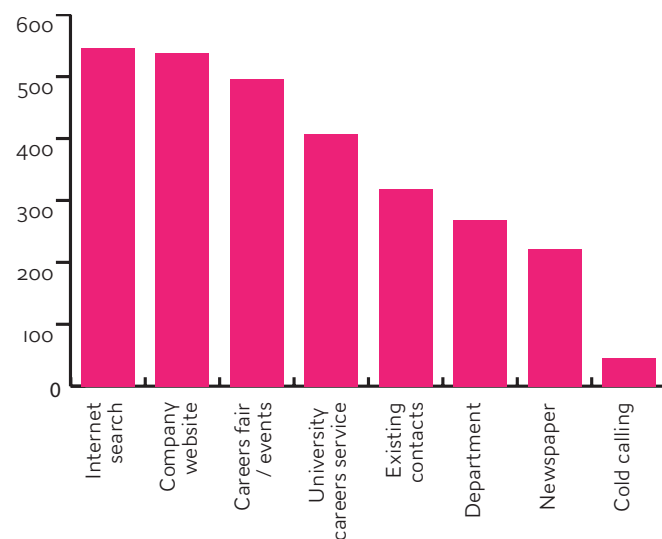


Figure 6: Sources used when looking for a graduate position, internship or placement.

Recommendation 1: A single internet site/portal is required for SMEs to distribute opportunities around HEIs.

This recommendation originated from an SME, and it contributes to Goal 4, Objective 4 of Warwick's University Strategy. It is recommended that the site should be easy to use; for example, an advert posted once could be disseminated around multiple institutions.

During the research, a similar site was under development by a group of Midlands universities.¹⁰ Its design encouraged companies of any size to post vacancies and, when they did so, they could select which HEIs their vacancy would be disseminated to.

Commercial organisations were attempting to provide a similar service. Rajeeb Dey, the CEO of Enternships.com, a platform aiming to connect students with SME employment opportunities, explained that his organisation wanted to be a national brand in order that SMEs would turn to them as the 'first port of call' when looking for 'campus talent'. Students were mobile, often living and studying in different places, which was another reason a national profile was necessary. If students went to their HEI careers service, he noted, they could get good one-to-one advice, but they might not be able to get information of opportunities

10 West Midlands Universities, West Midlands University Careers Services <wmucs.ac.uk> [Accessed 8 May 2012.]

in their home town. As well as having a national presence, Rajeeb also recognised the need for 'local platforms' so that SMEs and students could effectively engage with the service.

A representative from a science park noted that SMEs tended to be loyal to their locality and so weren't too concerned about advertising jobs widely. They also tended to hire through personal contacts. These preferences emphasise the need for localised services, but indicate that SMEs could be reluctant to post information on websites. The representative concurred that a brand with national visibility and reputation would be needed to change deep-seated trends.

During a study carried out in 2008, only 25 per cent of West Midlands graduates surveyed thought that the HEI careers service they used was effective.¹¹ The main criticisms were 'too generic' and 'still based too much on traditional "milk round" and large company graduate schemes'. It is logical that HEI careers services engage with large companies more effectively than with SMEs, when large companies are very likely to recruit graduates every year in significant numbers, and have resources dedicated to recruiting graduates.

A common theme that emerged from this research was the lack of resources SMEs have for recruitment compared to large companies. SMEs

11 Graduate retention attraction and employment study 2008 (p. 20).

may not have human resources departments and their capacity to engage with HEIs could be hindered as a result. Careers fairs, as an example, typically run during the working day of 9 am to 5 pm, which may prohibit SMEs engaging with them. A recruitment intermediary noted that SMEs prefer to meet other companies outside of core office hours, i.e. at breakfast, lunch or after 4 pm.

Recommendation 2: Students should set up networking events for SMEs.

This is a recommendation to encourage interactions between students and SMEs that do not fall within traditional models. It aligns with Goal 2 Objective 2 and Goal 4 Objective 4 of the University of Warwick's University Strategy document. It also complements one of the eight core values at Warwick – 'Entrepreneurial flair: An entrepreneurial attitude is an integral part of the University's make-up.'¹²

Rajeeb Dey noted that the principle of students setting up events was a good one as 'they have a good sense of what would appeal to other students':

'A student-run networking event should be fun and free. The intention would be for students – and maybe SMEs – to explore opportunities they haven't heard about before.'

¹² *University Strategy*, University of Warwick (p.4).

What attracts SMEs and students to events?

'[SMEs] are predominantly interested in getting more business,' was an observation made by a university business advisor. Any event organised by an HEI should aim to meet an SME's demand to generate business, whether directly or indirectly. The resource constraints of SMEs should be carefully considered and a networking event should therefore leave all parties – SMEs in particular – feeling that they have had a positive experience.

Both students and SMEs need something substantial to attract them to an event. What would attract one SME or student, however, might not attract another, so more than one event could be considered, or a single event could incorporate a number of different elements.

A representative from a science park noted that the aims of an event should be clear so all parties know what to expect. Mixing academic networking and student networking may not be a good idea, they added, as students tended to behave differently with their tutors around. Ideally, a networking event would be planned and set up in consultation and collaboration with SMEs so that the requirements of the SMEs could be incorporated into the event.

Interviewees from local councils noted that any event should be well planned; aspects such as time and location should be carefully considered. For example, a place of business might be more convenient for SMEs than a university campus.

Council chambers or a room at a local science park could probably be obtained free of charge. They concurred that holding an event outside of core office hours could also benefit SMEs.

The challenge of getting SMEs involved was a concern for all of the parties interviewed. Defining the event clearly was imperative: an SME could only get interested in something that had a clear programme and clear aims. The councils and careers services in the research emphasised the need for a good mix of participants in order to make a networking event successful.

Examples of networking events

During the research, ideas for elements that could attract SMEs and students to networking events were suggested. Some of these included:

- Local businesses sharing their business experience with students;
- A high-profile speaker could be booked to attract both students and SMEs;
- A topic that appeals to both SMEs and students could form a panel discussion;
- Events could be subject- or sector-specific, e.g. 'consultancy as a career for statisticians';
- Workshop sessions could be held for SMEs to bring technical, marketing, or IT problems for

students to solve. Alternatively, problems could be hypothetical and aimed as an intellectual challenge. This would need planning in advance and the students could pitch ideas to the companies at the event.

- An event pairing students with employment or summer placement opportunities could involve a recruitment agency to vet student CVs. The event would become a first interview opportunity, where the student meets the owner or CEO of the company.

A large bank currently runs a challenge for entrepreneurial students at the University of Warwick to write business plans for SMEs. A partner science park hosts the events and finds SMEs in its network that could benefit from the exercise.

A networking event was held at the University of Warwick at the end of the research, details of which are included at the end of this report (Appendix 3).

Sustainability of events

An academic observed that student-led events relied heavily on student enthusiasm, which could vary from one year to the next. To encourage continuity, they suggested an event could be attached to a society or a university department.

Careers services and recruitment groups we spoke to were keen to be involved in networking events. One interviewee warned that audiences could be split between events if important stakeholders weren't involved.

A science park representative noted that they were planning to run an event where larger SMEs (10 to 50 employees) would set problems for groups of students as intellectual challenges. Without setting the outcomes too strictly, the projects would at least give the students good experience of interacting with the business community. It could also lead to further opportunities, or to encourage the students to set up their own businesses. The representative emphasised the difficulty of getting SMEs to an event and strongly recommended that students work in partnership with somewhere like a science park, who could help 'drag in SMEs'.

Networks and Networking

A common opinion that ran through discussions with academics, SMEs and intermediaries was that setting up links between HEIs and SMEs was difficult. The main reason for this can be attributed – very broadly – to cultural differences between the parties although once links have been set up interactions appeared to occur easily. Making use of existing links would therefore be invaluable for students who may not have established links with SMEs. For the same reason, however, HEI stakeholders who have links with SMEs are protective of those links.

Alumni extend the networks of an HEI into many countries across the world. In addition, they have emotional links to an institution, and some own or manage SMEs. Opportunities to involve alumni in a networking event are numerous from publicising and marketing an event, to providing resources or giving a presentation. Networking events should take place overseas, and with partner institutions. A variety of internet technology could be used to communicate and interact with overseas alumni from the HEI.

An HEI's own links to SMEs could be used to set up an event. The careers services, academic departments and academics all have networks. Outside the HEI, science parks could have links, and there could be links with local councils, chamber of commerce, LEPs, and other trade organisations. The Students' Union and student societies could help

to provide an event that would be well attended by students, accessing their membership and marketing an event through avenues such as social media, lecture shouts, etc.

Large corporations may also be interested in an SME networking event. Many corporations are linked to SMEs, such as banks with business support or manufacturing companies with SME supply chains. If linked with an HEI, a large company may support an event or promote it to its SME network.

If students organise a networking event, they experience working in networks because an event becomes a network in itself. The students organising the event could also find themselves well placed in the networks they have been interacting with, especially if the event was a success. If students leverage a network to set up an event, it is essential the event is a positive experience and generates goodwill to all of the stakeholders.

A consultant for Graduate Advantage, a Midlands graduate internship project that specialises in recruitment to SMEs, said:

'Only 20 per cent of job opportunities are advertised, 80 per cent are the hidden labour market. Modern graduates should be networking – where do your parents work? Which companies do you come into contact with? There's truth in the cliché "it's not what you know, it's who you know".'

Unpaid internships

A consultant for Graduate Advantage gave this opinion on unpaid internships:

'It needs to be the right person with the right company. An organisation should add value rather than get routine work done for free. Students should have control of what they do; they should agree how many hours to give, what experiences they will get, how the SME can mentor them and what they will be contributing to the company.'

Rajeeb Dey's opinion of unpaid internships:

'Whilst the majority of roles on Enternships.com are paid, for those companies who have unpaid roles we encourage businesses to cover expenses at the very least. Companies need to create a win-win with an intern. Short unpaid internships can be beneficial for an intern and often leads to employment, especially if the intern makes themselves indispensable within the business. Both parties need to be clear about each other's intentions.'

One SME interviewed had a negative experience of unpaid internships. They had been using an automated process to produce quarterly reports for a customer but this ended when the customer took on three unpaid interns to generate the reports by hand.

Key Theme 2: Do SMEs understand what graduates want and what they can offer? (Recommendation 3)

Although 100 per cent of the STEM students who responded to the survey thought the university focused more on large companies than small, 93 per cent did not rule out working for an SME at some point after graduating (7 per cent wanted to work only in large companies) (Fig. 7).

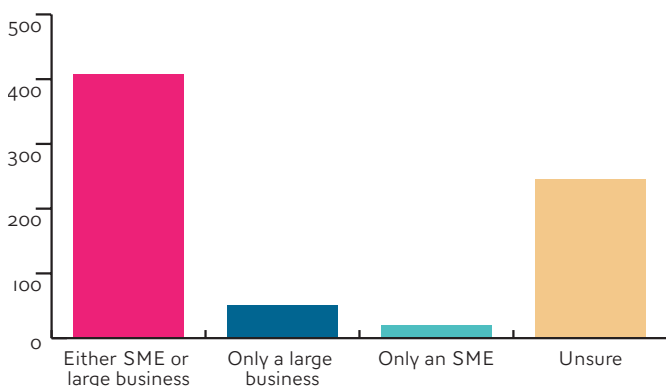


Figure 7. What size of business do you see yourself working for in the future?

In the interviews there was no consensus whether SMEs or large companies could better offer what the interviewees wanted from an employer, although there was a majority view that it was easier to make a difference in an SME than in a large company.

Previous research has suggested that two factors

stopping companies employing graduates were high costs and lack of skills in graduates.¹³ From the STEM student survey, however, the students' main priority for employment was career progression. This was followed by job security, research opportunities and then financial reward (Fig. 8).

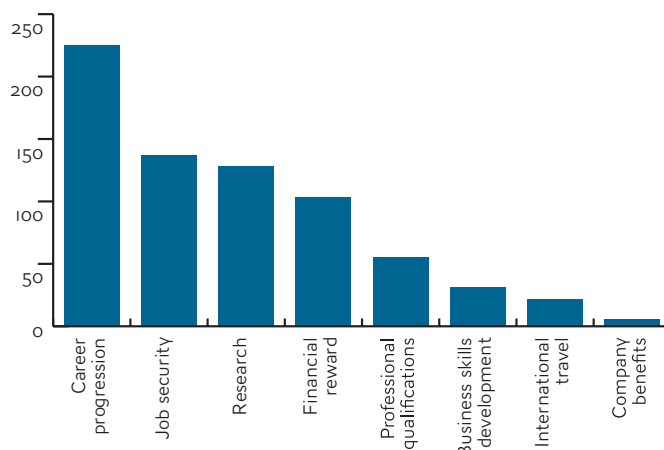


Figure 8. The most important factors for students when choosing an employer.

Many SMEs surveyed offered both paid and unpaid placements. The benefits perceived among the SMEs of employing a graduate appeared to be skills, contemporary knowledge and fresh perspectives. The phrase 'pairs of hands' was used frequently, implying that the SMEs in the study considered graduates to be useful contributors.

¹³ *Graduate retention attraction and employment study 2008* (p.17).

When interviewed, an IT SME speculated that graduates could take on responsibility earlier in an SME than in a large company. One engineering consultancy interviewed noted that a graduate employee could have the full responsibilities of a consultant within two years. Duties included finding new customers, developing technical specifications and then pitching the specifications. The same engineering consultancy didn't think career progression opportunities were well conveyed by job adverts although, when they had recently approached a recruitment agency about recruiting graduates, the agency had asked about career progression at the company.

Recommendation 3: Where applicable, SMEs should advertise the potential for career progression in their graduate positions.

The local councils involved in the survey agreed with this point, adding that job adverts were difficult to compose and SMEs might need help to word them accurately. Generic wording could also be used to draw attention to the fact that opportunities arose in SMEs as they expanded. Other parties involved in the research, such as recruitment consultants, re-iterated this point. Some went further, adding that SMEs may not fully realise the benefit of recruiting a graduate or student (see recommendation 6, below).

These conclusions indicate that improvements in communication between SMEs and students

could improve employment interactions (i.e. placements, internships and graduate positions). A representative from a science park suggested that, as well as SMEs promoting career progression, HEI careers services could educate students on how to develop their career in SMEs.

Key Theme 3: What do students know about SMEs? (Recommendation 4)

37 per cent of students in the survey had never had any interactions with companies – large or small – and 54 per cent had never had any interactions with STEM SMEs. Only 28 per cent of students knew someone who worked in a STEM SME (Fig. 9).

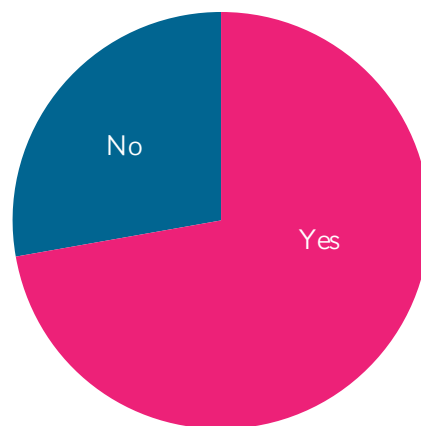


Figure 9. Do you, or someone you know, own or work in a STEM SME?

2 per cent of STEM students surveyed owned their own business.

74 per cent did not know about company funded research taking place at the university (Fig. 10). Looking further into what kind of research students did know about, all of the projects were either with a specific department well known for industry links, or with spin-out companies from the university.

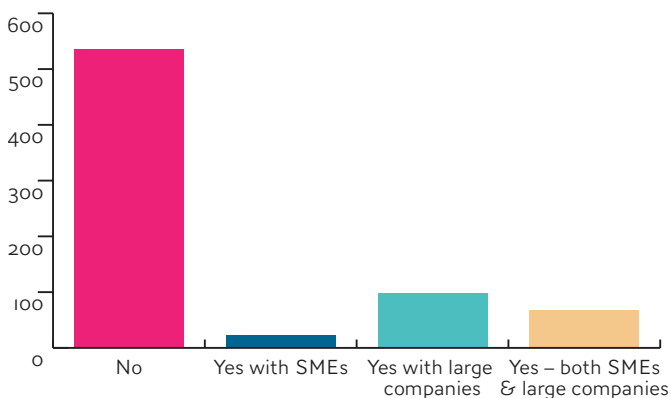


Figure 10. Do you know about company-funded STEM research taking place at your university?

Recommendation 4: Universities should ensure that information about company-funded STEM research is available to students.

This could be a student-led initiative with the support of a university department or society. One academic commented that using an existing electronic newsletter in their department would be practical for this purpose. Another academic noted that his department was very keen to implement

this. Staff had already begun to share information about their research at the beginning of a lecture course as a response to a student request.

The local councils agreed with this recommendation, suggesting that a smart-phone application could be useful to encourage students to read the information.

One SME suggested linking the dissemination of research information with a student networking event.

Key Theme 4: The potential for increasing interactions (Recommendations 5 and 6)

All of the SMEs surveyed who had had interactions with HEIs in the past were hoping to increase these interactions in the future. Even the SMEs who gave the most negative feedback in the survey concurred with this finding. A general finding of the research was that setting up interactions was difficult but once a relationship was established, interactions could follow relatively easily, and interactions could be numerous. For example, it wasn't uncommon for an SME to have a director or CEO giving guest lectures, while at the same time recruiting a graduate from the HEI, and employing students on summer placements.

When questioned, the primary reason SMEs gave for doing guest lectures was for networking and not financial rewards.

Recommendation 5: University STEM departments should encourage more guest lectures.

Guest lectures could be at little extra financial cost to the department, although advice might be required to help make a guest lecture relevant and engaging. This recommendation complements Goal 2, Objective 1 of the University of Warwick's strategies (see page 7, above).

One academic noted that guest lecturers sometimes misunderstood the academic level of undergraduates, and the relevance of guest lectures was very hard to control. Engaging alumni was therefore one way to mitigate this risk.

There were other factors that could prohibit academics organising guest lectures with SMEs. For example, lecture courses have to be planned by an HEI far in advance, which could be less convenient for SMEs working to shorter deadlines. If a guest lecturer cancelled at the last minute, an SME could be less likely to provide a replacement than a large company. Negative experiences like this tend to put off both parties from future interactions, which was applicable to all interactions and not just guest lectures.

The most common difficulties mentioned by SMEs were around time and communication – the timeframe HEIs worked against was too long and slow for the SMEs, and finding the right person to talk to in an HEI was difficult. SMEs frequently mentioned that a single point of contact could

improve interactions.

Universities commonly have strategies encouraging more placements and intercalated years,¹⁴ while the Wilson report recommended engagement of LEPs to promote HEI and business interactions:

'University career services and their LEP should collaborate to establish a skills supply chain between universities and local business, integrating placements, internships and employment services.'¹⁵

The councils noted that HEIs were a selling point of a region as they helped attract businesses. Improving employment links between students and SMEs would assist the development of the economy, whether through summer internships, year placements or part-time employment. Although student employment offered low-cost resource to businesses while providing vital employment experience to students, the numbers of students taking intercalated years – or sandwich degrees – had been declining.¹⁶

¹⁴ *University Strategy*, University of Warwick (p. 6).

¹⁵ *A Review of Business-University Collaboration* (section 6.4.3, paragraph 5).

¹⁶ Education for Engineering, *Sandwich Courses in Higher Education: A report on current provision and analysis of barriers to increasing participation* (July 2011). <http://www.educationforengineering.org.uk/policy/pdfs/Sandwich_course_report.pdf> [Accessed 30 May 2012].

It is well documented that doing work placements is beneficial for future employment prospects. For example, the West Midlands Observatory reported that, of the students they surveyed who had done work placements, 75 per cent said it was important or essential in helping them to secure a job.¹⁷ (20 per cent of the graduates they surveyed had had a work placement.)

Our student survey showed that 72 per cent of STEM students would like to work with an SME or large company as part of their coursework (69 per cent would work with an SME or a large company, while 3 per cent were willing to work only with an SME) (Fig. 11).

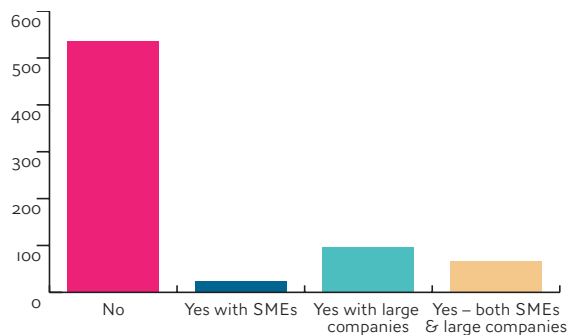


Figure 11: Would you like to work with a STEM company as part of your coursework?

A representative from Graduate Advantage noted that HEIs were emphasising graduate employability as a 'differentiating factor' to attract students as the

¹⁷ *Graduate retention attraction and employment study 2008* (p. 25).

new university fees were about to be introduced and the expectations of students was anticipated to rise. A science park representative concurred, adding that a lack of experience was often a barrier to students getting a job, and the type of experience a student got 'working behind a bar' was often insufficient. Different types of work experience could provide different levels of experience for the student. At the very least, it demonstrated punctuality and reliability, while further skills could be acquired such as IT or communication skills. But work experience could extend to skills that were specific to a profession, such as working in a lab.

The councils recommended increasing SME employment opportunities for students and graduates, claiming this would be possible if SMEs fully understood the benefits the different employment possibilities could bring to their business. The councils admitted that they themselves did not understand all of the ways that student employment could help a business and, if SMEs were similarly unaware of the business benefits, they would have no reason to pursue interactions. The councils recommended that HEIs deliberately market the benefits of the different forms of student employment to SMEs, ensuring that the business benefits were clearly highlighted. The councils offered to assist with this promotion among SMEs, noting that it was in the councils' interest that interactions improved. Rather than recommending one institution over another, they wanted SMEs to benefit from HEI resource that

was 'available on their doorstep'

Recommendation 6: HEIs to further promote student and graduate employment in SMEs.

An academic agreed with the recommendation but warned that trying to add work experience to a curriculum would be problematic, not least because finding and guaranteeing placements for each student would be very difficult for a department.

The science park representative noted that HEIs tended to market themselves to businesses in the same way they market themselves to students. There was a subtle difference and businesses – especially local SMEs – may not respond to the same marketing messages that students would respond to.

An academic suggested that students could work at a placement throughout their course, varying their time in a workplace to prioritise study commitments. This arrangement would be a mix between studying and a secondment.

A manufacturing SME said that more emphasis should be put on final-year student projects to produce work with industrial applications. The challenge would be for companies to provide problems that would be suitable as a student project.

4. Student reflections

Michael Cumming

When I first discovered this project, I found myself wondering why I'd never really interacted much with SMEs during my time at Warwick. Having worked for two different SMEs during my summers before coming to university, it struck me that they'd fallen off my radar since I'd become an electronic engineering undergraduate. I couldn't pinpoint any good reasons for this and felt compelled to get involved with the research to understand why.

Upon joining the research team, I expected to discover a clear-cut way of analysing interactions between HEIs and SMEs. I expected there to be a coherent set of previous studies that we would be able to build upon. Moreover, I expected our findings to highlight a single principal recommendation for improvement. I was taken by surprise when these expectations didn't ring true and spent my first weeks on the project adapting to the misty world of social research.

Once I had settled into this new working environment, I started to really value the fact that we students had so much control over the direction of the research. Being able to decide everything from the structure of our interviews to how we would disseminate our findings was a rich and

immersive experience. Working out the clearest way to word our survey questions was something that I found particularly enjoyable and beneficial. Likewise, I strongly valued this first opportunity to use both our own and established methods to analyse qualitative data. Indeed, counting the number of times that respondents mentioned particular topics in their interviews turned out to be an unexpectedly engaging experience. Furthermore, I feel the sense of ownership that we had over the whole project provided us with an insuppressible source of motivation. The knowledge that this was our research and that it could deliver real improvements to SMEs and HEIs drove me to constantly put my best efforts into our work.

For me, the most inspiring finding from this research is that the number of SMEs looking to interact with HEIs in the future is 20 per cent higher on average than the number currently doing so across all interactions (except student sponsorship). This mouthful of a fact indicates that, despite all the problems that may arise in establishing interactions with HEIs, more and more SMEs want to get involved with universities. The significance of this is that it confirms our research is relevant to the current SME-HEI environment. Moreover, it suggests that the implementation of

our recommendations on facilitating interactions between the two could greatly help them towards achieving their intentions. I find this extremely encouraging and it has instilled me with a strong desire to ensure that our recommendations are as helpful and as feasible as possible.

Through taking part in this project I have learnt a lot about myself, especially in terms of the areas of research that I enjoy and what motivates me. I have also developed a whole host of research skills, from effectively communicating with interviewees to efficiently organising vast quantities of data. The chance to experience all these benefits, whilst working with such an open and dedicated team, is indeed a rare occurrence. I am extremely grateful to have had this opportunity and look forward to seeing the team spread their wings ever further as they move on to pastures new.

Alex Mockridge

I have worked for IATL before, notably on the King's Warwick Project (Creating a 21st century curriculum). Hence when I found out about the opportunity to join this project, I was eager to get involved. This time I was working with a completely different team, but I had confidence in the IATL philosophy of "the student as producer", that we could produce relevant and insightful research despite being undergraduates. As I am now in my fourth year of university, studying Financial and Actuarial Mathematics, I have enjoyed this project as a way of building on a lot of my experiences at

the university, as well as exploring new areas that I was previously ignorant about.

Something I particularly enjoyed about this project was the opportunity to be involved in gathering and analysing data from the survey design stage right through to the high-level interpretation stage. As a student in the department of Statistics, I am very used to analysing data, but I had never been involved in actually gathering data before. I was pleased that we were able to get over 700 responses from second-year and above students in STEM subjects, more than meeting our target of reaching 15 per cent of these students.

I think that a great deal of the successes of this project can be put down to our excellent teamwork and the sublime organisational skills of our project manager Nick Tipple. Thanks to Nick we were able to arrange productive meetings with many influential contacts in the HEI, SME and local government arenas. These meetings were crucial to our research, as not only could we benchmark our findings against the opinions of others who had worked in the area, but we were able to gain new insights into the project and increase awareness of our research. On a personal note, I found that it was a great experience having to explain our research clearly to non-experts and network with them, as I would not have had the chance to develop these kind of communication skills in my degree.

The most challenging part of the project for me

was time management. Whereas with the King's Warwick Project (KWP), a lot of our initial research had been documentary and theoretical, this project had a more applied and hands on approach, which required a lot of shifting deadlines and pre-arranged meetings. The wide scope of the research was extremely challenging, since we felt that we needed to research students, academics, SMEs and intermediaries such as local government, all of which needed different approaches.

Nevertheless, I feel that we coped well with the time pressure, and I was grateful that the IATL was flexible with my work on the project so that I had enough time to dedicate to academic work and final-year dissertation.

Along with Sze, I chose to focus mainly on the student side of interactions with SMEs. I found this very interesting, as it tied in the most with the work I had done before on the KWP and it meant that I could work with the large dataset from the student survey, applying techniques that I had learned during my degree. For me the most interesting finding of the report was from this data, that financial reward was only the fourth most important factor for choosing an employer according to the STEM students we surveyed, the three most important being career progression, job security and research. For me this highlights how little work has been done in this area before, since most people, including myself, would normally assume that financial reward would be much higher up the

priorities list. This is a positive indicator for SMEs, that they need not necessarily compete with the starting salaries offered by large companies when trying to recruit graduates.

In summary, I am once again very grateful to the IATL for this opportunity. Even in my final year at university, I was able to learn a lot and experience new things that I would never normally have had the chance to do. I am proud to have been part of the project, and I think that as a team we achieved some great results. I think the comment that I had from a job interviewer – who I described my work at IATL to – says it all: "That sounds like the best part-time job ever!"

Oliver Newth

As a final-year Engineering student research forms only a minor part of the curriculum due to its applicable nature. As such I had little experience of the methodology such projects require. Whilst it originally felt like a daunting process, the project was structured so we were involved in all areas, from forming the methodology onwards.

One area I have been heavily involved in with the project has been with the technical aspects. This stemmed from my background in website design and application development so I saw an opportunity to apply this experience to the project. We used an online survey application called 'Survey Gizmo' to collect responses from students, SMEs and HEIs which allowed us to ask questions in

more unusual ways. One example included ranking aspects of a graduate job, where students were able to drag the options into their order of preference. This seemed like the ideal manner to collect this data and provided valuable results.

Individually, I have developed a lot of research skills and have learnt a lot in terms of how to analyse data. The experience of other members of the team was invaluable in the development of the research and it's been a brilliant experience to work within the MEA6 team and hope that the findings from the project will have a real, practical application which will improve the interactions between HEIs and SMEs.

Sze-Yin Tan

I am a third-year undergraduate pursuing a Master's in Chemistry. I aspire to become a world-class researcher in my chosen field hence I was drawn to IATL and its motto – the student as producer. This was a great personal motivation to me because our research would only be as good and meaningful as the hard work we put into it. This has been an invaluable growing experience in which I was able to research and learn in a way that consolidates and substantiates the values of academic life.

As I originated from a scientific background, the consistent production of written material was not always my major focus. However this project has enabled me to address the above aspect, increasing my confidence such that effective report-writing can

now be included amongst my portfolio of skills.

Having previously worked as an intern at two SMEs over summer vacation periods, I was intrigued by the project proposal and as a student, I felt it would be interesting to study the current interaction between HEI and SMEs and research potential areas where these interactions can be optimised.

Internship opportunities at SMEs produced a conducive environment for me to develop employability skills. One skill that I find particularly important is knowing about the companies and industry that you could potentially work for in the future and according to our student survey, only 28 per cent of students knew someone working in a STEM SME. I think this number is rather low considering that 93 per cent of the students did not rule out working for a SME in the future. General awareness about SMEs is rather low amongst students even at university level.

Lastly, I am extremely thankful to IATL and the MEA6 team that I work with for giving me an educational experience that I will never forget. I was able to learn a lot about myself as I was given the platform to step out of my comfort zone and undergo things I normally would not have been able to. This was definitely an incredible learning experience.

Appendix 1: A summary from the desktop study

Advantage West Midlands (AWM) was a regional development agency which aimed to improve the region's economic development and lead social and physical improvement.¹ Between 1999 and 2012, the agency invested £3 billion in local businesses sourced from UK and EU funding and claimed that businesses gained £8 for every £1 they invested. The investment supported 150,000 businesses and created 10,000 businesses. They also stated that £2 million in private finance has been raised and that funds have been used to redevelop 1,200 hectares of brownfield land.

The Manufacturing Technology Centre was set up as a joint venture between AWM and the East Midlands Development Agency, located at Ansty Park near Coventry. Its research partners include a number of regional universities, while founding industry members were aeronautically related, such as Rolls Royce and Airbus UK. It aimed to bridge the gap between academic research and commercial production. Reports produced by the centre claim that the regional development agencies' investment in the project will return £46 for every £1 invested, and that it will create or safeguard 2,100 jobs, build

1 Advantage West Midlands, *Making a difference: 1999 – 2012* <tinyurl.com/83mjmhr> [Accessed 14 May 2012].

625 businesses and generate additional sales of around £5.5 billion in the next 10 years.²

The West Midlands Economic Strategy in 2005³ aimed to ensure the region was a 'global centre where people and businesses choose to connect'. It suggested the region would be £10 billion richer if productivity was raised to the national average (the region performed at 89 per cent of the national GVA average).

The Regional Development Agencies have been replaced by central government departments and the newly-created Local Enterprise Partnerships.

The Technology Strategy Board is a government-funded organisation with the objective of increasing innovation in the United Kingdom. Its work brings together a variety of stakeholders in British industry, including both SMEs and HEIs, in areas of technology development and application. A series of schemes are run by the organisation, such as the

2 Advantage West Midlands, *Ansty Park News 9/07/2010* <www.anstypark.co.uk/in-the-news/news/2010/mtc-construction-on-track.aspx> [Accessed 14 May 2012].

3 Advantage West Midlands and West Midlands Regional Assembly, *Connecting to Success*, <tinyurl.com/c755s8l> [Accessed 14 May 2012].

Knowledge Transfer Networks (KTNs) that facilitate communication and knowledge transfer amongst industry and academia. Collaborative Research and Development (CR&D) funds opportunities for research undertaken jointly between companies and the research community; Smart Grants are similar to the CR&D funding, but available for individual SMEs without the need for partnership arrangements with other organisations. SMEs can compete for a fully-funded contract to develop and commercialise their solutions with Small Business Research Initiatives (SBRI), while Knowledge Transfer Partnerships (KTPs) are a research collaboration between business and an HEI.

The West Midlands Regional Observatory (WMRO) was formerly part of the Advantage West Midlands (AWM) and became part of Marketing Birmingham – a public-private partnership – in April 2011. WMRO's aim is to provide public and private organisations with high-quality data upon which to base their strategies and service provisions. The relevance of the WMRO's work to SME-HEI interactions lies in the datasets it produces.

The Federation of Small Businesses (FSB) is a business network which promotes the interests of small businesses and has over 200,000 members. FSB recently urged the government to create a National Mentoring Scheme, providing SMEs with a business mentor to assist them to, amongst other things, engage with HEIs.

The British Chambers of Commerce (BCC) is a business network similar to the Federation of Small Businesses. Unlike the FSB, it represents businesses of all sizes and has a membership of 100,000 companies. The BCC is made up of 52 accredited Chambers of Commerce, which are located in different geographical regions across the UK. These member Chambers are leading the creation of Local Enterprise Partnerships, which replace the former Regional Development Agencies. The British Chambers of Commerce could be well placed to facilitate SME-HEI interactions via the LEPs, which has been suggested in the Wilson Review (see Key Theme 4, above). An example of this is the partnership established by the Leeds Chamber of Commerce between the two Leeds-based HEIs and local businesses. The Leeds Chamber facilitated this by providing SMEs with useful university contacts whilst identifying graduate opportunities at the companies.

The Higher Education Academy (HEA) is an HEI-facing intermediary capable of influencing the STEM curriculum. It aims to improve the student learning experience at HEIs through the identification and sharing of good teaching practices between academic institutions. In striving to achieve this aim, the organisation sports a 1.5 million-document Resources Centre, in addition to hosting a range of subject-specific journals. It is also a funding body, with a £1.5 million government remit in the 2011/12 academic year for projects in line with specific objectives. The HEA also shares

good teaching practice and, as such, it serves as both a source of reference material and as a dissemination avenue for this research.

Student, academic and SME interactions – KTPs

Perhaps the most direct form of interaction between SMEs and HEIs is a knowledge-transfer placement. While most HEI and SME interactions tend to be one way, knowledge-transfer placements involve a student from an HEI going into a company to work, while still maintaining contact with the HEI's research environment. The student associate therefore acts as a bridge enabling the two-way knowledge transfer between an HEI and a company.

An important example of knowledge transfer placements is the Knowledge Transfer Partnership (KTP) scheme; a national, government-sponsored initiative that enables access to knowledge and technology. They are part-funded by the government's Technology Strategy Board (TSB) and the European Regional Development Fund (ERDF) and run in HEIs across the UK.

At its most basic level, the KTP is a partnership between a company and an HEI set up to pursue a specific project. A student or graduate – an associate – is selected from the HEI to work on the project under contract at the company, while being supervised by an academic consultant. The associate has access to the expertise and facilities

of both the business and the HEI, and part of the project is funded by the UK government. The length of a KTP can range from twelve months to three years.

Although not limited to SMEs or STEM, KTPs are an excellent example of how a STEM SME could access HEI-based knowledge and technology, even if it might not be able to afford to fund HEI research. Companies benefit by gaining a highly skilled and motivated graduate, while having access to the academic consultant and the HEI's facilities at a reduced tariff. They are protected by their contract with the HEI, and can have a probationary period at the start to make sure that they are getting the deal they want. Generally the outcome of a KTP results in an increase to the profitability of a company.

The HEI, and specifically the academic supervisor, benefits from research generated by the KTP, collaborative links formed with the company involved and of course through research income. Currently, the average KTP generates 3.6 new research projects and two new research papers for the HEI.⁴

The associate benefits from the experience they will gain on the project, a competitive salary and the opportunity to register for a higher degree. They are often offered a full-time job at the end of the KTP's

4 Knowledge Transfer Partnerships, *About KTP* <www.ktponline.org.uk/strategy> [Accessed October 2011].

lifespan. The current statistics are that three out of every five KTPs result in the associate accepting an offer of full-time employment at the company they are working at, while two out of every five associates take the option to apply for a higher degree, with an approximate success rate of two thirds. In addition, a company and HEI in a KTP are likely to plan future collaborations.

Similar schemes have been adopted by HEIs. Warwick Knowledge Transfer Secondments (WKTS) are funded by the Engineering and Physical Sciences Research Council (EPSRC) for staff and post-PhD researchers at the University of Warwick whose EPSRC-funded secondments have run out. One of the stated aims of WKTS is to allow researchers to take their research towards application by users, which means the companies involved are predominantly STEM SMEs working on cutting edge STEM research. At time of writing there were thirteen WKTS in progress.⁵ The WKTS scheme has a lifespan of three years, from 1 October 2009 to 30 September 2012, while the KTP scheme is funded indefinitely, and has been in place in some form since 1975. The WKTS scheme is based around high-level STEM research and funds both HEI researchers seconded to companies ('outward secondments') and research projects at HEIs that build on EPSRC research ('inward secondments').

⁵ University of Warwick, *Funding to Exploit EPSRC Research* <www2.warwick.ac.uk/fac/sci/wkts> [Accessed October 2011].

Appendix 2: Student responses as a function of department size

The Faculty of Science is the second-largest faculty at the University of Warwick (see Fig. 12).¹

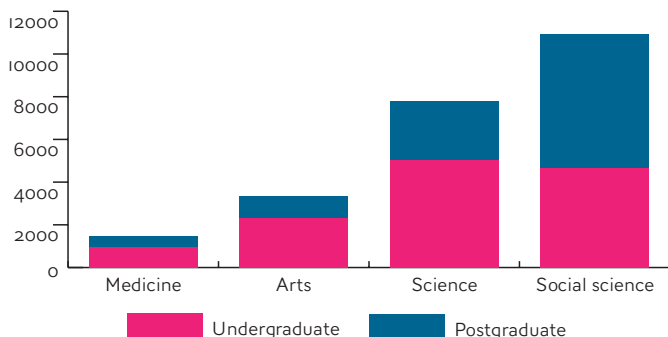


Figure 12. The number of students in each faculty of the University of Warwick during the academic year 2011/12.

The most recent data available at the start of the research was from academic year 2010/11. The Faculty of Science at the University of Warwick splits into 11 departments, as illustrated in Figure 13, where CSC is the Computer Science Centre (which has two postgraduate students) and MOAC stands

for Molecular Organisation and Assembly in Cells.

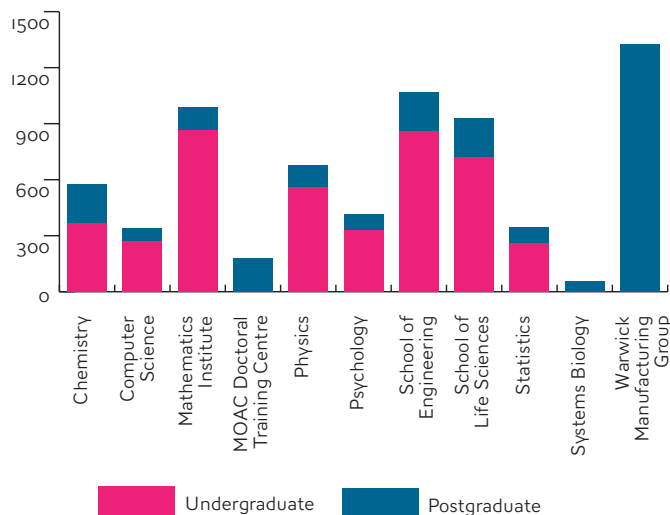


Figure 13. The Faculty of Science of the University of Warwick divided into its departments in the academic year 2010/11.

For the purposes of this study, the population of STEM students was calculated using Life Sciences (both undergraduate and postgraduate courses) and Systems Biology (a postgraduate course only). Psychology was excluded from the study because the team thought it did not fall within the definition of STEM, and the first year undergraduate figures were also excluded. (This leads to a disparity in the

1 University of Warwick, Figure 1.1.1. *Summary of student enrolments (heads) by faculty and year of study, 2011/12.* <www2.warwick.ac.uk/services/mip/businessinformation/academicstatistics/2011/table_1.1.a.pdf> [Accessed on 29 May 2012].

total science student data between Figure 12 and Table 1).

Table 1 – Number of students in the survey sample as a proportion of the Faculty of Science.

Students	Population size	Sample size	% size
Undergraduate	2641 ¹	550	20.8
Postgraduate	2639 ²	172	6.5
Total	5280	722	13.7

Table 2 contains data from the categories that were available to select in the student survey. The fields were purposefully limited to keep the survey as succinct as possible; however, there are two postgraduate groups that complicate the statistics. WMG had 1057 postgraduate students in the academic year 2010/11 and MOAC 230 postgraduate students. Neither of these courses fit strictly into the categories that were available to students in the survey. The table has included the statistics in the nearest categories available in the survey: Engineering for WMG and Chemistry for MOAC

Table 2 – Number of students in the survey sample as a proportion of each department.

Department	Population size ³	Sample size	% sample size
Maths and Stats	1003	190	18.9
Engineering (inc WMG)	2142	166	7.8
Physics	563	121	21.5
Biological/Life sciences	699	88	12.6
Chemistry (inc MOAC)	626	86	13.7
Computer Science	247	61	24.7

(although Biological Sciences may have been used).

Two categories that were in the survey and have not been included in the table are 'Physical Sciences' and 'Other (science)', which received four and six responses respectively. (They have been included in the survey results.)

- 1 University of Warwick, *Table 2.1 Statement of Full-time Undergraduate Home & Overseas Enrolments by Department and Year of Study* <www2.warwick.ac.uk/services/mip/businessinformation/academicstatistics/2011/acstats_-_table_2_1.pdf> [Accessed on 29 May 2012].
- 2 University of Warwick, *Table 2.7 Statement of Taught and Research Postgraduate Enrolments by Department, Mode of Attendance and Fee Status* <www2.warwick.ac.uk/services/mip/businessinformation/academicstatistics/2011/acstats_-_table_2_7.pdf> [Accessed on 29 May 2012].
- 3 Undergraduate and postgraduate data taken from the same references as in Table 1.

Appendix 3: Startup Milkrounds come to the University

During the last weekend in April, the National Association of College and University Entrepreneurs (NACUE) announced a partnership with Enternships.com to facilitate a series of 'Startup Milkrounds'. They would distribute £500 grants from the Department for Business, Innovation and Skills to 20 student enterprise societies. The grants had to be spent by the end of the academic year.

The Warwick Entrepreneur Society was awarded one of the grants and Nicholas Tipple collaborated with them to organise an event. Nick and Warwick Entrepreneurs agreed that the event would serve as a pilot: it would be a chance for the Entrepreneurs to work with relevant stakeholders and to see what might be possible for future events. Their aim was to get five or six companies to meet with 20-30 students. In the end, 19 representatives from local businesses met with 41 students.

Inviting companies

Initial contact was made with intermediaries: the University of Warwick Science Park offered to host the event and a representative from the Federation of Small Businesses (FSB) in Coventry replied to an enquiry made to the Local Enterprise Partnership.

The brief from NACUE and Enternships.com was to host startup companies who had placement

opportunities, but the FSB noted that asking companies to bring summer placements was 'too much pressure' and they recommended inviting companies to talk about business. Companies would be enthusiastic to do this, the FSB noted, and if the FSB had a detailed plan for the event, they would pass an invitation to the most suitable businesses in their network. A detailed schedule of the evening was sent to the FSB and, within 48 hours, four businesses committed to attend.

An email invitation was sent to all 189 of the SMEs who had completed the HE STEM research online survey, and phoning round the businesses gradually increased the number of attendees.

The evening would be a barbecue held on the 21 June, from 4 pm to 6 pm, with a panel discussion for the first half and informal chat and food in the second half. Companies were invited to share business experience and bring possible work placements. In all, 21 people from 16 local businesses accepted the invitation. The majority were contacts from the HE STEM research, a significant number came through the FSB network, and a couple were from academic contacts at the University of Warwick. Companies were varied and diverse, from a sports charity to logistics companies, university spin-outs to translation services.

Inviting students

The event was marketed to students through emails only, which were sent to third and fourth year undergraduates in a variety of science and humanities subjects. An event was set up on Eventbrite, which 80 students signed up to. Information sheets were made describing all of the non-student attendees, which was sent to all students before the event, along with a dress code and a recommendation to bring a CV.

Other attendees

14 people attended who weren't students or part of an SME. These included people from the Science Park, Barclays Corporate, Unitemps, Warwick Ventures, NACUE, the University's Institute for Advanced Teaching and Learning and its careers department.

On the night

There was a massive thunderstorm just as the event was scheduled to start. 19 business people attended (from 14 SMEs) and 41 out of the 80 registered students attended. Everyone was given badges and split into two groups. Hour-long discussions were held for an hour, facilitated by representatives from the Science Park. Each business introduced themselves and a discussion unfolded around how they got started and what advice they would give to students starting their own business. Food was then served as people networked informally. A 'soft finish' had been scheduled and the evening overran its

original two hours by 45 minutes. Each non-student guest was given a bottle of wine as they left.

The main aim of the event was met: every business who attended the event had a positive experience, although there were two key learning points for the event.

The two groups were too big: four groups should have been made to ensure that each business had sufficient time to talk. Groups of 30 to 35 were too big.

During the organisation of the event, the two aims – for businesses to talk to students and for businesses to bring employment opportunities – had become blurred and, on the night, some companies were confused.

Although the team had doubts about the diversity of the companies, this appeared to be a strength of the evening.

Feedback from business attendees

'We found the session useful and informative. The students seemed very switched on and we spoke to one young man who is interested in working with us. I think some of the students found the breakout session a bit intimidating. It would be better if we could break into smaller groups next time. We would be happy to attend if you organise another session.'

'I thought it worked well as a format, although perhaps students could select which group of





Deborah Calogian
Intern

businesses they wanted to join depending on their interests. Happy to help at any future events.'

'I thoroughly enjoyed it. You need to be clear on the objective(s), e.g. to help students get jobs, or to help them start up their own enterprises. It could be both.'

'I thought it was an excellent event with a good mix of people and a positive vibe. I think the following were achieved:

- Students were able to discuss business ideas with people experienced enough to offer valuable advice - one of the suggestions made in our large discussion was to seek advice from as many people as possible, which this event helped facilitate;
- Students were able to experience a business networking event, which will be a new and probably uncomfortable environment for many, but one as budding entrepreneurs they need to be familiar with and confident in if they are to grow their businesses;
- Students were given advice about how to approach SMEs with a greater chance of success in obtaining employment - the needs of an SME owner and the ways they work are very different to large organisations, which is something students need to be aware of and adapt to;
- Students were able to find out about where they

can get support and advice from in the future in order to develop their business ideas - those who are genuinely entrepreneurial will probably have a number of ideas at different points in time, so establishing links and awareness early on increases the chances of these ideas being turned into action;

- SME owners were given the opportunity to meet potential employees - as entrepreneurs themselves what better place than through an entrepreneurial society at the university?
- Successful business people were able to share their knowledge & experience - business owners have a great sense of pride in what they do and have been able to achieve (often starting with very little) so are keen to help others, but without an event like this would have little opportunity to do so.' Colin Hall, Barclays Corporate

Videos of attendees giving feedback on the event at Warwick are available on the NACUE website: www.nacue.com/2012/06/startup-milkrounds-student-and-startup-perspectives/

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