

Engaging 14-19 year olds in Engineering Education



AN EVALUATIVE CASE STUDY OF

THE JCB ACADEMY, 2014-2015

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Background

This evaluative case study of The JCB Academy was funded by the Comino Foundation¹, which is a registered UK charity. In the light of continuing concern in England to improve secondary education's contribution to practical, technical and vocational capability, this document makes the findings of that case study, and subsequent reflections, available to a wider readership, as a prompt to further consideration of the questions raised.

It is published with the agreement of The JCB Academy.

The Comino Foundation

The Comino Foundation's current priorities are:

Social opportunity – which to the Foundation means finding approaches/initiatives which help young people, whatever their

background, to live fulfilling and productive lives in ways that have meaning and value for them.

Personal capabilities – developing approaches which enhance young people's personal capacity to cope with the demands of growing up and with adult life.

Improving practical, technical and vocational capability – especially that which relates to designing and making, to innovation and to manufacturing.

Those priorities led to an interest in the University Technical College (UTC) movement in general and contributed to discussions with the Baker Dearing Trust and direct contact with the first UTC, The JCB Academy.

In 2014, The JCB Academy suggested to the Comino Foundation that it would welcome an external evaluation of its work.

The Foundation agreed to support the preparation of an evaluative case study and assembled a team with relevant experience. The team was led by Professor Ian Jamieson, OBE. Other members of the team were Dr Lynne Bianchi, Professor José Chambers, MBE and David Perry. The team's methodology is outlined in Appendix 1 and their background experience in Appendix 2.

The basic question was:

'To what extent has The JCB Academy fulfilled the intentions of the UTC model and how has it tried to do that?'

The research was carried out during the 2014/15 academic year and the evaluative case study was written up in the summer of 2015.

Having completed the case study, the team explored some of the wider implications.

¹ www.cominofoundation.org.uk/



The context – technical and vocational education in England

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The history of England's attempts to get to grips with technical and vocational education is a well-rehearsed saga:

'Since Prince Albert established the Royal Commission in 1851 policy-makers have struggled with our failure to provide young people with a proper technical and practical education of a kind that other nations can boast. 160 years later the same problems remain.'²

In 2010 the Baker Dearing Trust, which 'promotes and supports' (UTCs), commissioned the Edge Foundation to undertake an historical and comparative review of these attempts from the 1880s until the current time³. The review charts in detail the sundry educational initiatives which, once launched, have struggled to provide a viable vocational and technical pathway for young people. It contrasts this English failure with models developed in a range of other

countries including Germany, Sweden, Japan and the USA: these models have been markedly more successful, although also not entirely problem-free.

It has been argued that part of the problem is that in England there has never been a clear consensus about the nature and purposes of education. A recent study of education in England concluded that there was:

'No single, simple widely accepted view about what education should be aiming to achieve, what skills and values it should instil and therefore what an ideal curriculum and balance between the different subjects or areas of study might be.'⁴

Without such a consensus about education, it is clearly difficult to forge a widely-supported vocational and technical education pathway. This has led to a long series of initiatives from different

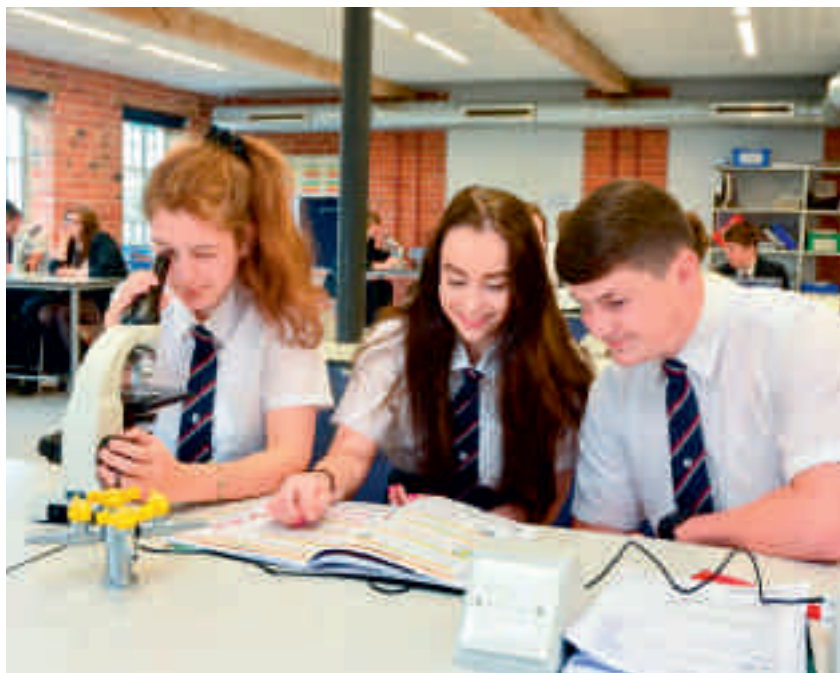
governments which have often been given little time to become established before being swept away by successor administrations and replaced by something different. Ewart Keep, one of the more thoughtful commentators on this area of educational provision, has documented, as 'one of the



² Foreword to Review of Vocational Education – The Wolf Report, March 2011.

³ Richardson, W. and Wiborg, S. (2010), English Technical and Vocational Education in Historical and Comparative Perspective: Considerations for University Technical Colleges, London, Baker Dearing Trust.

⁴ Pring, R., Hayward, G., Hodgson, A., Johnson, J., Keep, E., Oancea, A., Rees, G., Spours, K., Wild, S. (2009), Education for all: the future of education and training for 14-19 year olds. Abingdon, Routledge.



established features of English vocational education and training reform', the plethora of initiatives in which 'successive cohorts of ministers, prospective ministers and officials':

'Have tended to bill their latest wheeze as the reform to end all reforms, only to see it vanish in the next, subsequently found to be essential, round of change. As a consequence of this perpetual cycle of re-engineering of the certification system, the area of vocational qualifications is now littered with the burnt out husks of what were once deemed to be 'the next best thing'⁵.'

There are other background issues worthy of note. Historically vocational education, except that leading to the professions, has been seen as mainly for those that could not manage to achieve in the academic realm and there has been an assumption that social mobility through education is to be achieved

by success in academic subjects. This has been underscored by the universities, whose courses have been largely organised around academic subjects, a tendency reinforced by the conversion of the vocationally-oriented polytechnics to universities in 1992. It has been further reinforced by the view championed by some in government that the most effective mode of teaching is the didactic, not the active and experience-based learning that is often a feature of effective vocational and technical education.

It might also be argued that attitudes to industry in this country have not been helpful. On the one hand, until very recently, policy makers in successive governments have assumed that England's future prosperity lies in the service industries, so that the marked decline of manufacturing industry has been treated as inevitable. Though attention has been given

to skills needs, for instance through various government commissions, there is a persistent sense that problems remain:

'The Review found that, even if current targets to improve skills are met, the UK's skills base will still lag behind that of many competitor countries in 2020. The UK will run to stand still.'⁶

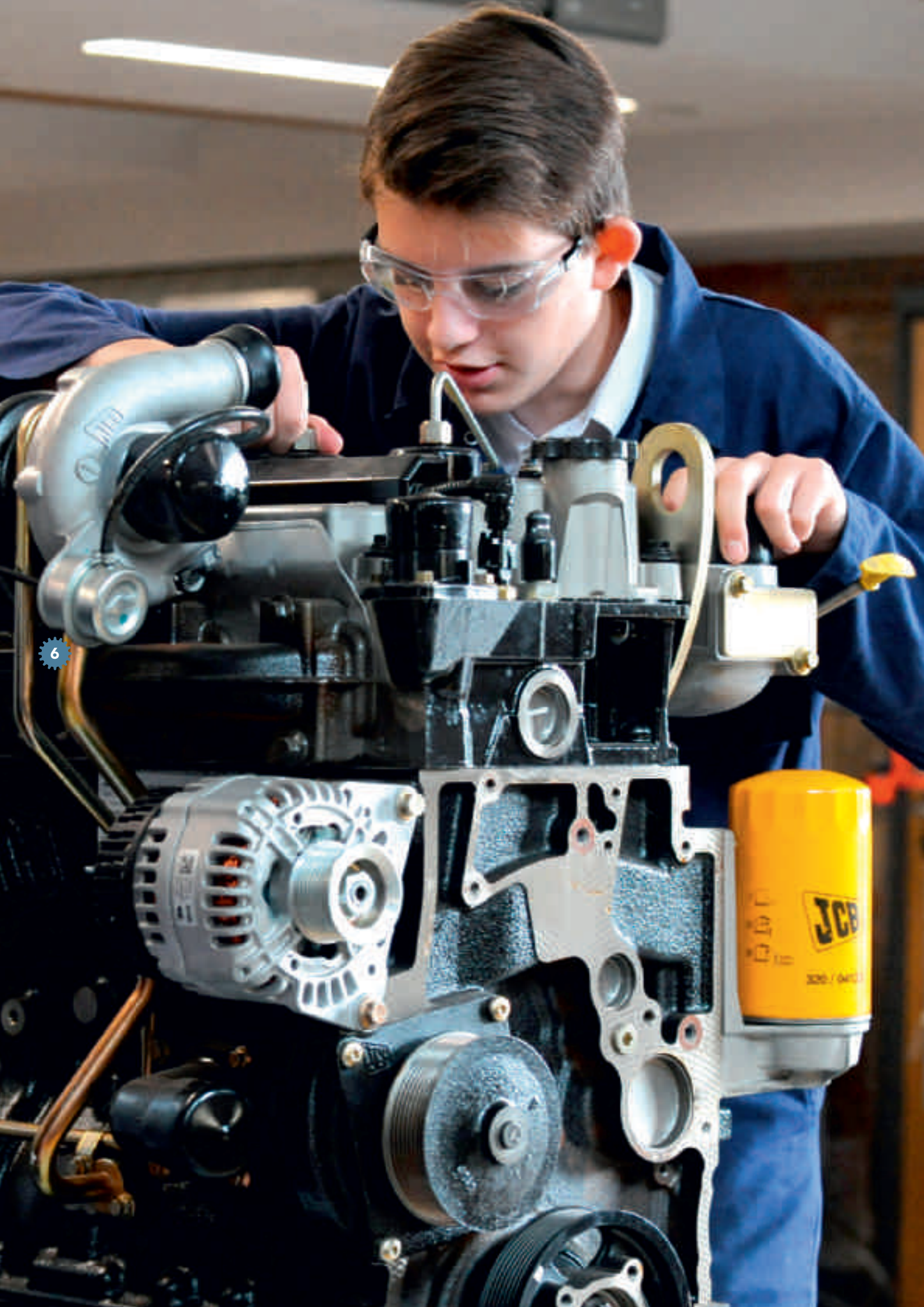
Unlike many of their industrial counterparts overseas, for instance in Germany, in the UK smaller and medium-sized companies have seemed to be reluctant to accept responsibility for initial training and to hold a view that education at all exit points should be producing graduates who are not just 'work ready', but ready for work in specific roles. More recent investments in apprenticeships might prove to be a welcome counter to this.

In view of this context it would not be unreasonable to conclude that UTCs face stiff challenges if they are to be successful. In the review commissioned by the Edge Foundation, Richardson and Wiborg⁷ helpfully set out some of the specific challenges that UTCs will face. We have used those challenges as the basis for our own evaluation of the first UTC, The JCB Academy.

⁵ Keep, E. (2015), 'Thinking about where to go and what next to do in the reform of vocational qualifications' Journal of Education and Work, 28, 2, p.119

⁶ The Leitch Review of Skills 'Prosperity for all in the global economy – world class skills' – Final Report, December 2006

⁷ Richardson, W. and Wiborg, S. (2010), English Technical and Vocational Education in Historical and Comparative Perspective: Considerations for University Technical Colleges, London, Baker Dearing Trust.



The JCB Academy – its specific context

The JCB Academy opened as a new foundation, under the Department of Education's (DfE) sponsored academy programme. It is housed in a converted Arkwright Mill in the village of Rocester, Staffordshire very near to the JCB Headquarters. When it opened in 2010 it had 120 Year 10 students (14 year olds) and 50 students in Year 12 (16 year olds). In his foreword to a report⁸ celebrating the first year of the Academy, Lord Baker outlines the origins of the Academy and describes it as 'the first UTC'. The JCB Academy was officially converted to a free school University Technical College in January 2013 by the DfE.

The Baker Dearing Trust argues that the radical nature of UTCs means that it is highly unlikely that the conversion of an existing school complete with its existing teaching staff to a UTC would work – a view strongly endorsed by the current principal of The JCB Academy. The proposition is that a UTC requires the recruitment of new staff sympathetic to the specific aims of UTCs and open-minded about what is required to make them work.

It would be difficult to overestimate the importance of JCB (J.C. Bamford Excavators Limited) in the foundation of The JCB Academy. JCB is a British multinational corporation, with its headquarters in Rocester. It manufactures

equipment for construction, demolition and agriculture. Not only was it instrumental in the original concept of the Academy, but it continues to contribute to it a significant amount of staff time, from the charring and servicing of the governing body, to supporting teaching and hosting the annual awards ceremony. It has also been crucial in the recruitment of other industrial partners.

As a private company with a significant profile in the engineering industry, JCB has had a long history of supporting education initiatives which it saw as relevant to its short and long term needs. At various points in time it has experienced short term problems in the recruitment of both apprentices and fully skilled engineers. These problems have focussed on the quality of applicants as much as their quantity. Senior figures in the company also have developed a long term view that these recruitment issues, shared, it is said, with many other companies, can only be solved by improving understanding of the challenge and excitement of engineering and boosting its profile amongst young people. This long term vision is shared by all the engineering business partners of the Academy.

Our interviews with JCB personnel revealed both their present and past involvement with many education

business initiatives, most with an engineering bias. A JCB Design and Technology Centre had, for instance, been established at the University of Staffordshire, until the university decided to close it. There had also been interest in JCB becoming a key sponsor of a City Academy with an engineering focus, but ultimately the company felt that this was not quite the right initiative for them. A JCB employee closely involved with the founding of The JCB Academy remembers 'a mix of drivers' which led to its setting up. These included the company's sense that it needed 'a step change in its relationship with those educating young people locally' and 'a belief in contextual education linked to local employers'. Ideas were developed by looking at existing provision in the UK and in Sweden. Lord Adonis, Minister of State for Education 2005-8, gave his support to the model which emerged. When the Lords Baker and Dearing visited in 2005, they are reported to have said, 'this is exactly what we have been looking for', so that eventually The JCB Academy came to be known as 'the first UTC'.

⁸ Ware, J. 2011, The JCB Academy Year One – Baker Dearing Educational Trust, p4.

Establishing and sustaining a wide range of business partnerships

JCB has therefore made – and continues to make – a very significant commitment to the Academy which bears its name, both in terms of capital investment and staff time and expertise whilst continuing to support related initiatives to the benefit of other schools. Our interviews also revealed how important the role of a committed senior industrial figure can be in persuading equivalent members of other businesses to join in supporting such an initiative. One interviewee openly contrasted this approach with the experience of being contacted by those ‘from education’. All of the business partners with whom we spoke shared a common concern with the profile and reputation of the engineering industry, underpinned by a desire to recruit good quality people into their business though not necessarily expecting to recruit employees direct from the Academy. They were also mindful of their own reputations and were keen to be seen as companies that

took corporate social responsibility seriously. A number of companies have publicly expressed the view that there is an acute shortage of young people ‘of the right calibre’ keen to enter engineering. One ex-JCB senior employee said that he had made a habit of urging people working in such companies to engage in supporting the Academy.

Our interviews revealed that JCB also used its influence as a major manufacturer and benefactor to encourage its suppliers and beneficiaries to join with it in its support for The JCB Academy. This influence extended to its university partner, Harper Adams.

It seemed to the evaluation team that another part of the effectiveness of this ‘recruitment’ was that it was done at a very senior level. All the companies which we talked to reported that the partnership arrangement had been agreed by the CEO and approved by the Board. The university partnership was negotiated directly with the Vice-Chancellor. It was also the case that all the partners regarded their commitment as ‘a permanent arrangement unless concerns arise’ (senior executive of a multinational company). In our sample companies, the progress of the partnership was reviewed annually at a very senior level. Three of the companies, JCB, Toyota and Rolls-Royce, also contribute governors to the governing body of the Academy and thus have a direct stake in the activities and progress of the institution.

It is one thing to acquire industrial partners. It is quite another to bring them together into a coherent and

effective educational provision, and then retain their active and enthusiastic engagement. All of our evidence, gained from speaking to students, teachers and the industrial partners, suggests that this has been successfully accomplished. From the perspective of the industrial partners we believe that there have been three major factors which have contributed to this success.

First there was initial planning which involved all the companies. A two day residential meeting at the beginning of the foundation of the Academy was used to establish the purposes and ambitions of the Academy and what the industrial contribution could be. All the partners reported that this had been a critically important event, not least because it established the unique territory of each company. It also allowed for coherent planning of the curriculum, which avoided unnecessary duplication. This initial consultation was followed by a further detailed planning event. The companies liked the practical focus on what they could actually do and the care taken to identify their individual expertise and strengths.

The second factor was encouraging companies to identify and continue to focus on their unique contribution. In the case of Toyota, for example, the students are introduced to Toyota quality assurance and process control methods based around the concept of ‘continuous improvement’ (Kaizen) as well as ‘lean manufacturing’, through activities modelled precisely around actual Toyota procedures.

The third factor was the way in which the companies, working in





collaboration with staff and students of the Academy, learned what was practical, feasible and likely to be successful in an educational environment. Here we noticed the important role played by the Academy staff in advising and guiding the planning process and working to bring the plans into operation. From the Academy point of view it was clearly important that the challenges set up by the industrial partners fitted into the syllabus and qualification framework that the institution was negotiating with one of the examination boards. The Academy also had to make sure that the tasks and pedagogies were appropriate for the age range. All of the company personnel that we interviewed praised the Academy staff for their help in making the company contribution work in the context of 14-19 education and all commented that they had learned a good deal about the educational process through the discussions. What we thought was particularly important was the fact that many of the Academy staff, because their professional engineering or business background, worked in tandem with their role in the Academy as 'teachers' or learning mentors,

were able to bridge the education-industry interface. They were dual professionals, learning to be at home in both environments.

We enquired about the costs of the contribution from the industrial partners, but it seemed from the answers we received that the costs of their contribution were not a significant issue. JCB, as the founding business partner, was clearly in a special position and it had made a major contribution both to the initial building costs and to equipping the Academy with industry standard technology. It also contributes, on an ongoing basis, both HR and legal services at marginal cost. It was by far the biggest contributor of staff time in support of the Academy, with some time being contributed by up to 12 people at the time of the evaluation. One company had attempted a calculation of direct costs but admitted that these were hard to estimate accurately. Another company required a budget, which had to be approved by the MD. The major cost element in all cases was staff time. Whatever the calculations, all the business partners reported that these costs were not

seen as significant in the overall budget of their company.

We asked business partners whether their companies' contribution to The JCB Academy had made any changes to their other education-industry activities – in other words had there been a displacement effect? (Some commentators have suggested that these activities could constitute a zero sum game.) The evidence presented to us from the companies did not suggest that this hypothesis could be supported. The companies reported a very wide range of links with schools and colleges as well as with national initiatives focussed on the engineering industry.

In terms of outcomes, a laudable culture of 'this is a venture that must succeed' was evident and had clearly sustained The JCB Academy through several difficulties and setbacks. The companies all expressed satisfaction and confidence that The JCB Academy had created a model that would make a difference in the long run to both the status of engineering and to the flow of capable people into the industry. Most company personnel were particularly impressed by the



behaviour and performance of the students at the Academy. It is worth recording however that one company, whilst agreeing that the Academy produced ‘very capable students’, suggested that the Academy was overly prescriptive in its curriculum and offered young people little space to develop their entrepreneurial and creative skills. On the one hand companies thought that it was useful for students to experience industry’s need for extreme precision and a strict conformity to detailed procedures and methods of production; on the other hand they wanted to recruit engineers who could think for themselves as creative problem solvers⁹. We suspect that this is a dilemma built into Engineering education, but one that may be felt especially sharply at the school level.

Another outcome we observed was that these companies were becoming more interested in apprenticeships. There were

a number of reasons given for this. First, they felt that they could have more control over the apprenticeship programme than they could over the curriculum, even at the Academy. Secondly, their view was that, for the moment at least, apprenticeships were beginning to be better funded by the government. Thirdly, it was likely that many of their apprentices would directly enter their business and they would see an immediate return on their investment. In the case of The JCB Academy they felt that the apprenticeship programme would need to grow, not least to help solve the Academy’s funding problems. Most also recognised that in order for this to happen the Academy would need to find ways of making the apprenticeship experience sit more comfortably inside the 14-19 culture of the institution and vice versa.

Finally, all the companies believed that they had learned a great deal from their experience as working

as partners of the Academy. One respondent said:

‘Our eyes have been opened as to the complexity of providing the supply chain of young engineers.’

Many of our industry respondents also commented that the whole process of teaching was much more complex than they had initially thought. As they learned more, they became ever more critical of what they perceived of the government’s educational policies. Those that had been involved in the initial setting up of the Academy were withering in their comments on the ‘help’ that had been offered by the DfE. Once the Academy was up and running they could see the damage done by the constant changes to the curriculum and the assessment regime as a result of government reforms. They were also deeply concerned about the government’s funding model. They believed that it did not reflect the true costs of running an engineering-based

⁹ Lucas, B., Hanson, J., Claxton, G. (2014) Thinking Like an Engineer – Implications for the Education System – A Report for the Royal Academy of Engineering, P51.

Academy. There were also specific concerns about the replacement of expensive machine tools once they had reached the end of their life and about the cutting of the budget for transport to the Academy, particularly hard on a specialist institution which draws students from a very wide region.

The University Partner: Harper Adams University

The initial design of UTCs outlines the role of a university partner. The current UTC website¹⁰ suggests that it might include:

- providing teaching staff to help in specialist subjects, e.g. maths for engineering
- nominating governors to direct the leadership of the UTC
- giving students an insight into university life
- organising access to specialist equipment and facilities on campus
- providing individual mentors for students
- guiding students on the best route for their goals.

The university partner of The JCB Academy is Harper Adams University, a university specialising in agricultural sciences with a particular emphasis on agro-engineering. It is located about 35 miles away from the Academy. The main reason for this choice of partner was that the university already had very strong links with JCB – which is a major player in the agro-engineering business. As a company JCB has sponsored undergraduate students

on Harper Adams sandwich degree programmes, endowed the library and supported various relevant research projects. It also has a senior member of staff on the governing body of the university. Both organisations share a commitment to supporting the engineering industry and increasing the flow of well-qualified graduates into industry.

Harper Adams University sees a significant fit between its own activities and those of The JCB Academy, partly because working with the Academy provides yet another channel for the university dialogue with JCB, a dialogue which is important for the university. The university also sees the partnership with the Academy as a significant link to its own widening participation agenda. As a result of the partnership, university staff are in close contact with young people studying at the Academy and have access to their longer term aspirations and decision-making as they head towards employment or higher education. The university staff have learned, for example, that to fire up the student imagination



about engineering it is more effective to engage students in a specific engineering-related activity, rather than expecting them to listen to talks and watch presentations.

The relationship between the Academy and the University is still evolving, because both partners continue to learn what is important and likely to be successful in the relationship and what is not:

'The thing has developed. We've got to the point where we know why we're doing it – we have a sense of responsibility and ownership.'
(Harper Adams tutor)

One of the main issues facing the Academy is that the students already have three years of secondary schooling at other institutions before they join. The students will therefore have fashioned a view about what school is like, what constitutes learning and teaching, and what is appropriate behaviour. Much of this learning may not fit the distinctive attitudes and behaviours which the Academy wishes to encourage. The Academy's prospectus identifies 'the key life skills essential for success in the world of work and in society' as:

- A 'can-do-will-do' attitude
- Pursuit of technical and academic excellence
- Achieving through actions
- Passion for quality
- Creative and enterprising behaviour
- Team and leadership capacity.

¹⁰ <http://www.utcolleges.org/about/universities/> ¹¹ <http://www.utcolleges.org/about/universities/>



So, one of the main functions of the university's partnership with the Academy has been to help re-orientate these students right at the beginning of their Academy experience to a more mature approach to study – to the 'JCB Academy way'.

The approach used to achieve this is a one week residential experience held at the university immediately when students join the Academy. This residential experience is jointly designed by staff of the

university and the Academy. It is held in September, before the start of the university year. The objectives of the experience are clear. The first objective is to establish this new cohort as a group, for instance through team and confidence building exercises, and to introduce them to the Academy's House system. These activities are jointly run by staff from the Academy and the university, with the occasional help of an external company specialising in outdoor learning. The second objective

is to introduce students to the mature standards of behaviour which will be expected of them at the Academy and are expected of students of the university. The third objective is to introduce students to engineering and to help them begin the journey that will assist them in starting to 'think like engineers'. The final objective is to introduce the new students to the experiential, problem-based model of learning which is central to learning in both the university and the Academy.

When the programme was first initiated, the university had sole charge of its organisation and the university Students' Union provided student volunteers to help facilitate the activities and to act as role models for the students. The model has now evolved so that it is run more as a partnership with the Academy. The Academy has 15-20 staff onsite for the whole week and a group of Year 12 students from the Academy itself. These students, it is thought, reinforce and model the JCB Academy way'.

The main contribution of the university staff is to run an Engineering Challenge – which





requires a response to a real world problem. This introduces the new students to the concept of the Challenge as a major mode of learning used by the Academy. Naturally enough, given the context of the university, this first Challenge is related to agricultural machinery: the task is to develop a radio-controlled off-road vehicle capable of coping with typical agricultural terrain. The exercise is supported by mini lectures on chassis design, vehicle mobility and traction. The students work in teams on this project which occupies a significant part of the two week period.

The university sees significant benefit in this relationship, which is strongly supported by the Vice-Chancellor. The initial expectation was that the in-coming students, at the age of 14, would be exactly the right target audience and that the university would be able to introduce them to what engineering looked like in higher education. However, university staff have come to the conclusion that the 14 year old students are too young to understand this perspective. At this stage they do not have enough understanding of either

the basic science which underpins engineering or of engineering itself. As a result, the university is in the process of developing a small programme of work with older students, who come over from the Academy to the university to work with undergraduates. It is likely that this activity will develop with years 11 and 12 JCB students taking part in the university's Year 2 design challenge.

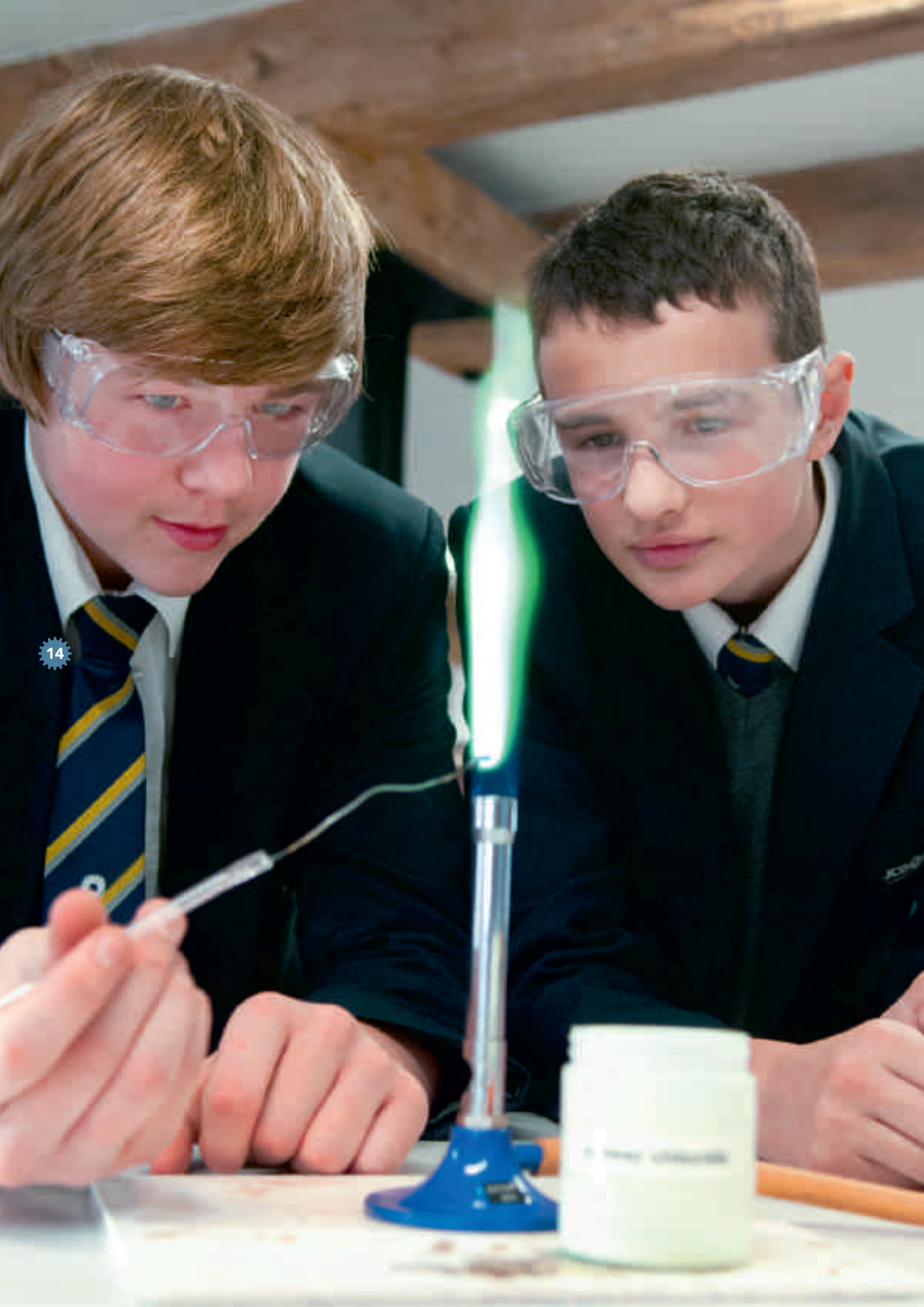
The university staff we interviewed said that they had been very impressed with these older students:

'Their maturity is very impressive – they are already talking like engineers – observing our students, noting their behaviour, commenting on the team dynamic.'

'Their confidence and communication skills are more advanced than those of our own new undergraduates.' (Harper Adams tutor)

There is a view in The JCB Academy that its university partnership is not as strong as it is in some other UTCs. Of course it is not possible for us to comment on this, but in our judgement the relationship with the

university is working well. The one week residential at the beginning is exactly the right sort of experience to re-orientate students to the very different model of schooling developed by the Academy. It also starts to forge the team ethos and to lay the foundations of the positive relationships between students and their teaching staff which are a hallmark of the Academy. Harper Adams has learned what sort of activities are likely to work with 14 year old students, and what level of knowledge it can assume. Without this willingness to adapt in the light of gradually acquired understanding it seems unlikely that the partnership would have been so successful.



The JCB Academy way – ‘a whole new way’?

‘UTCs teach students technical and scientific subjects in a whole new way and are educating the inventors, engineers, scientists and technicians of tomorrow.’¹¹

Since The JCB Academy was ‘the first UTC’, there were no existing models to emulate. The Principal of the Academy has a background in business studies and was much influenced by TVEI (Technical and Vocational Education Initiative¹²), which began as a pilot scheme in 1983, was extended nationally in 1987 and ended in 1997. It could be argued that many of the elements of the UTC model were present in TVEI. These included: business partnerships, the use of ‘adults other than teachers’ (known as AOTs) in the classroom, experienced-based learning, including work experience itself, as well as a focus on new ways of teaching and accrediting vocational subjects. One significant difference for TVEI was that these elements had to be fitted into mainstream schools and as a consequence none of the organisational changes that one sees in UTCs were a fundamental part of that scheme.

The JCB Academy Principal saw the UTC initiative as similar to TVEI in its aims but founding a new institution with new staff gave him an opportunity to make the necessary organisational changes at the school level and thus ‘do

TVEI¹³ properly’. He has a very clear commitment to the vision of UTCs and has considered carefully how that vision can be realised. This has meant that the organisation of the Academy – for instance in timetabling and staffing – is quite different from that in mainstream secondary schools. But the Academy’s key distinctiveness is not just in its structure and organisation: it is also in its culture. The Principal argues that in a situation where both staff and students are likely to have experienced the traditional school model, and therefore have expectations about how things should and will be, then it is vital to create a very strong culture where staff and students know about – and are proud of – ‘the (very different) way we do things around here’. The evaluation team’s interviews of both students and staff clearly indicated that he has been successful in this goal.

How it works: teaching and learning

The background of many of the 23 staff whom we interviewed was certainly different from what one might expect in a mainstream school. Firstly, significant numbers of them had experience outside education, mainly in engineering, and also in business. Some of that experience was at a very senior level. There was also a number with

a background in the armed forces, most of whom had held relatively senior engineering or technical positions.

Of those who were recruited from an educational background, quite a few had held positions in Design and Technology, often at head of department level. One of the features of this group was that many had become disillusioned with Design and Technology in schools. One spoke of the subject having ‘lost its way’, another of the subject failing to develop either trade or professional skills.

Many of those with an industrial or services background did not have qualified teacher status, although to designate them as ‘unqualified’ in a more general sense would be unjustified. One such had a first class degree in Engineering, along with a PhD in the same subject, as well as very high level experience in the engineering industry.

By and large The JCB Academy seems to have been successful in recruiting people who are knowledgeable, skilled and open to innovation. Together they have fashioned a structure and processes which have created a distinctively different model of education – and one which works. By ‘works’ we mean: the model motivates the students to achieve well in the core subjects and supports outstanding

¹¹ <http://www.utcolleges.org/about/overview/>

¹² www.leeds.ac.uk/educol/documents/00002214.htm

¹³ Jamieson, I.M. TVEI and the work related curriculum, Evaluation & Research in Education, Volume 7, Issue 2, 1993

achievements in Engineering. Student satisfaction levels with the teaching and academic work are high. The team teaching model, which mixes qualified teachers with staff who are professionally qualified, for instance as professional engineers, but who are not necessarily qualified teachers, also works very well in a number of respects and garners much praise and enthusiasm from the students. There is however a small number of teachers who have been recruited from mainstream schooling for whom the model has proved to be too radical and who wish that the Academy was more like a 'normal' school. The high workload has also contributed to these feelings.

The JCB Academy has a genuinely radical approach to teaching and its organisation. The two subject areas of Engineering and Business drive the Academy and the teaching methodology of these two subject areas has a strong influence on the teaching of the 'core' subjects of English, Mathematics, Science and Modern Languages. The model can be best illustrated by looking at the teaching of Engineering.

There is an overall Director of Engineering for KS4 (Key Stage 4) who has responsibility for the planning and implementation of the curriculum. Teaching is organised through the house system and there are three houses appropriately named Arkwright, Bamford and Royce. The Engineering teaching in each house is led by a team leader and supported by Engineering Learning Mentors (ELMs) and Learning Support Assistants (LSAs). The unusual nomenclature is important in that it represents a



deliberate attempt to signal a very different model of teaching from that adopted by the vast majority of mainstream schools.

There are two key terms which populate the model: 'team' and 'learning'. Teaching Engineering in the Academy is essentially a team activity with typically up to four teachers involved in any one session. The focus in Engineering, as in Business, is on student learning rather than on teaching. Although teaching in the core subjects is organised along more conventional lines, it is strongly connected to the learning activities in Engineering. This is achieved not only through curriculum planning but by the organisation of the teaching activities. Team leaders of the core subjects do 'snapshot walks' into Engineering sessions, in order to note good practice and identify any areas for improvement. This also means that their understanding of how their subject articulates with and contributes to Engineering is constantly reinforced. This model

is facilitated by another feature of the organisation of learning: the length of the working day and the length of sessions within that day. Learning in the Academy is organised in long blocks of time which gives the opportunity for teachers of core subjects to participate in Engineering activities, which would not be possible within a conventional school timetable.

One of the clear findings of the evaluation is that the Academy has a distinctive pedagogy that is threaded through the teaching in Engineering, Business and the core, though teachers in the core subjects found it less easy to adopt such a strong practical/investigative approach. The component parts of the model are: student-centred and experience-based, with a focus on developing students as independent learners and with engineering-relevant investigative skills. There is a significant focus on problem-solving. The interviews with the staff were replete with examples of the pedagogy in action. A typical

Engineering Learning Mentor declares:

'I won't do it for them or they won't learn anything.'

Another says that:

'There is little direct teaching: the teacher facilitates and guides.'

The success of this approach relies on the context of active collaboration between students and teacher and the capacity of the problem under scrutiny to provide the motivation to learn. An Engineering tutor says:

'We want students never to say, 'Why are we learning this stuff?''

In support of this set of principles, a host of pedagogic routines is established. These routines are designed to help students develop a reflexive capacity and useful habits of mind; many mainstream schools also regularly use such routines. Examples include: 'think, pair, share' to reinforce the importance of thinking before acting, working in pairs and articulating thinking to others. Reflection is also encouraged by rubrics such as 'www'

– which gets students to articulate 'what went well' alongside 'ebi' – 'even better if'.

Many of these routines were clearly linked by the staff to industrial and business practice. At a general level the concept of KAIZEN (continuous quality improvement) familiar to many of the Academy's industrial partners, particularly Toyota, was being used by teachers – and the Principal! – to encapsulate the essentials of attention to detail in the pursuit of quality. The approach was familiar to many of the students we interviewed. Many of the staff with industrial experience also found it helpful to point out industrial parallels to the students where appropriate. Students appreciated that staff have a richer background experience than most of their previous teachers:

'Most of them, when they're teaching us, they refer to personal experiences.'

'They all loved their job, you can tell that – they are passionate about it.'

'You sense they've had a life beyond school.' (three Year 12 students)

An Engineering tutor gave an example of how she had emphasised the importance of quality checks, risk assessments and planning in everyday engineering practice. When all of these features of teaching are added to the length and organisation of the Academy day, including the absence of bells, then it is easy to understand the constant assertion of the staff that the Academy is 'very much like a business'.

Meeting the Challenge – how learning and working merge at The JCB Academy

A key feature of the organisation of learning in the Academy is the 'Challenge'.

A 'Challenge' is an industry-led problem on which the students work for a concentrated period of 8-10 weeks. (Students also work on smaller scale 'mini challenges'.)

Companies work with the Academy staff to produce these Challenges which encapsulate problems that are, or have been, faced by the business. They are 'industry-led' in





the sense that these are – or were recently – real-life problems for the company and at the beginning of the Challenge it is representatives of the company who present the problem to the students. The Network Rail Challenge, for example, is:

'We want to increase the capacity of the Line between the Potteries and London by 25%: how do we do that?'

The organisation of the work on the Challenge is a collaborative endeavour which involves significant joint planning involving both staff from the company and the Academy. From the Academy side, care is taken to make sure that the tasks are suitable for the student age range



and also match the requirements of the relevant public assessment of student work.

A typical Challenge starts with the presentation by the company, which is often backed up by company visits. Company personnel, for instance recently recruited university graduates, then work with the Academy students as they tackle the Challenge. Company employees' work with these Challenges is acknowledged as a valuable part of their training. In the Toyota Challenge, for example, two members of the company spend one afternoon a week at the Academy for eight weeks. The students clearly get engrossed in this work which generates significant excitement and motivation. Despite the official 'no homework' policy many students reported taking work home to make sure that they met the Challenge deadlines.

The companies which produced the initial Challenges have stuck with them and developed the Challenges over time. Companies report being impressed by the students' responses to their Challenge, for instance Network Rail was reported as saying:

'Your students asked questions which we would be surprised if graduates asked.'

Companies also acknowledge the benefits to their own employees involved with the delivery of the Challenges. New companies are being sought to extend the model into other curriculum areas, for example, electronics, as well as to provide more Challenges in the Business area.

The Challenges represent one way in which the Academy engages with helping students develop employability skills. Our interviews with the students revealed that many of the young people attracted to the Academy believe that going to the Academy will help them get employment. The Principal is keen to stress that the Academy is about helping students develop employability skills rather than about getting students a job. There was general agreement amongst the staff interviewed that the Challenges do develop employability skills, including the key skills involved in 'learning to think like an engineer'.

For many staff the whole pedagogical thrust of the Academy is oriented towards students' employability. They pointed to the importance given to timekeeping, suitable behaviour, teamwork, peer review and regular feedback. In teamwork the staff argued that there was a conscious attempt to develop co-operation, listening and negotiation skills. The students do have plenty of opportunities to develop their presentation skills, often presenting their work to external visitors, for example in reporting on the outcomes of a Challenge. In English, the skills of writing a formal letter, an e-mail, a job application and a formal report were also specifically addressed.

Equipment at The JCB Academy

The JCB Academy is very well equipped with engineering equipment and this is especially important in the Challenges which are often geared towards an end product, commonly a precision-engineered product. One of the principles of UTCs is that they should mirror best workplace practice and this might be thought to entail the provision, for instance, of the very latest relevant engineering machine tools. Many visitors to the Academy, including the evaluation team, are immediately struck by both the range and volume of the equipment. One of our interviewees offered a different view:

'New UTCs go mad on the equipment. There is a lot of over-purchasing at the beginning. One UTC has a simulated production line which they will never use. Others have lots of stuff still in boxes, never unpacked.' (SMT member).

We have no way of judging the claims about other UTCs, but we do have a number of observations from staff about the equipment provision at The JCB Academy, most of which tends to support the above remarks. What interested us was that often these comments came from those members of staff who had the most recent and significant industrial engineering experience. As one Engineering team leader put it:

'It's generally too good to be true. It's not that it is too sophisticated but you could set up a place like this with far fewer machine tools.'

Another Engineering Learning Mentor observed that, 'some of the milling machines are never used. They are just collecting dust'. There are other issues about the equipment provision that were also made by respondents. The range and complexity of the equipment puts a significant strain on the technical support staff when it comes to assisting students with using the machine tools as well as maintaining and repairing the equipment. Finally, as industry

continues to innovate and retool, existing machinery will become out of date. This raises interesting questions for the Academy as well as other UTCs about how they should determine the appropriate level of equipment, as well as how they will maintain it and finance replacements.

The student experience

At the time of the evaluation, OFSTED¹⁴ reported that 91% of the Academy's students were boys and most were of White British heritage; the proportion of students known to be eligible for support through the pupil premium was below average; the proportion of disabled students and those with special educational needs supported through school action was above the national average; the proportion of students supported at school action plus or with a statement of special educational needs was average.

What factors were influential in students' choice of The JCB Academy? Our interviews with students picked up a wide range



of reasons. It was clear that, across the region, the reputation of the Academy has been steadily growing so that parents, relatives and family friends have started to form the view that the Academy is a good place for their children to be. The association with JCB is certainly helpful – several students mentioned that members of their family had worked for the company – which is seen locally as a good employer. The Academy's open days reinforced this positive impression: prospective students and their parents were invariably impressed by the quality of the building and equipment; by the enthusiasm and knowledge of the staff; by the guarantee of experiential learning with well-known companies and finally by the students' assumed improved career prospects.



the vast majority of students were satisfied with their choice and that the Academy had met, or in many cases exceeded, their expectations.

The first difference that new students at the Academy encounter is the different length of day at the Academy compared to their previous schools. The Academy day runs from 08.30 to 17.00 on three days a week with a finish at 16.00 on the other two days. In other words it is very much more like an adult business day; indeed most students recognised this as the reasoning behind the timing of the day. Some students who had been on work experience did point out that it was actually longer than many business days! Also, because the Academy is not located very near to any large centres of population, nearly all students needed to travel to Rocester using the buses organised by the Academy – and for some this involved journeys of an hour or more making for a demanding length of day.

Because of the location of the Academy, the students' day often begins at 07.00 and they do not return home until between 18.30 and 19.00. An issue about the length of the day, mentioned by quite a few of the students, was its consequences for their family and social life. Several students said that when they returned home there was too little time to see their friends and in some cases, enjoy the company of their brothers and sisters. The friends issue is exacerbated by the fact that their newly-made Academy friends are widely dispersed. However on the plus side, there is a formal 'no homework' policy at the Academy and this was viewed very positively by most students, who said that they preferred this arrangement to a shorter school day plus homework.

Many staff at the Academy believe that the length of the school day is a significant – and problematic – issue for their students. However nearly all the students we interviewed preferred this longer school day, with its absence of homework, to the

A significant group of prospective students told us that they were attracted by the engineering focus. This group was almost certainly in the majority but there were students who did not mention engineering as a key interest. Some of these seemed to be driven to choose the Academy mainly by a desire to start afresh in a new environment, leaving their existing school, where they had felt they were not flourishing. The Academy's reputation for smaller classes and more personal attention was an attraction, as was its perceived lack of discipline problems.

When we interviewed the students we asked them to look back and ask themselves whether they thought that their decision to come to the Academy was proving to be the right decision. Responses to this question strongly suggest that

arrangements they had previously encountered. As one Year 11 student put it, 'you get used to it and it has advantages'.

Many students commented, particularly in relation to previous school experiences, that the day passed quickly. The reasons for this approval lie partly in other features of the way the Academy is organised: sessions are divided into longer blocks of time to accommodate the more experience-based learning and provide space for the more complex and specific tasks that focus learning. Of course students do get tired at the end of the longer days but, as far as we could judge, in practice the way the timetable works takes account of this, for instance by not timetabling core subjects at the end of the day.

Most students that we interviewed were clear about how academic work was organised at the Academy and knew what was expected of them. They also seemed to have a clear understanding of the pedagogic model. In Engineering, teachers start sessions by stating the task and checking that everybody understands what is required. The

students often work in groups which have been pre-selected by the staff. In the classroom or workshop there are normally about 20 students and a minimum of two staff, but there could be up to four or five staff depending on the nature of the task, perhaps including a tutor, two Engineering Learning Mentors and one or two Learning Support Assistants. Students often mentioned how well balanced these teams were, with a rich range of experience and skills on which they could draw. Students rapidly get to know the expertise of the various members of the teaching team and know who to ask for assistance. They were particularly appreciative of staff drawing on real world engineering experience and of the passion they showed for engineering.

Although staff are always on hand to help when needed, the emphasis was on students finding out for themselves using the available resources. They recognised that these resources included each other, textbooks and the internet, as well as teachers, learning mentors and technicians. Learning was certainly reinforced and enriched

by the many contacts that students had with the Academy's industrial partners. Students also appreciated the help that was given when they were struggling. All students systematically recorded their work on the dedicated laptops that were issued to each of them at the beginning of their Academy career, a strategy that was warmly appreciated by all the students that we met.

The students were also very appreciative of the atmosphere that this collaborative model of teaching and learning created. As one Year 10 put it, comparing the Academy to his previous school:

'We are treated differently here – more like adults, not like children.'

Another spoke of the atmosphere of trust in class, of a 'two way respect with teachers'. A Year 11 student said that there was 'much less copying out of textbooks' compared to his previous institution. Nearly all students asserted the superiority of this mode of learning over that of other models that they had encountered.

Although this approach to teaching seemed well established across Engineering, it seemed that it was not quite so prevalent in the Business stream. Students said that Business teaching was 'more theoretical' and that there was too much reliance on teaching IT business packages like MS Office. They also declared that they wanted to meet more people professionally engaged in business, just as the Engineering students met professional engineers. A small number of students said that both Business and Engineering



lessons did not leave much room for creative responses – they were looking for more opportunities to demonstrate innovative thinking and entrepreneurial flair.

If the model of teaching tends to create an almost collegiate culture between staff and students, then this was certainly reinforced by other features of the Academy. For many students and staff the tone was set right at the beginning of their Academy career, through the residential experience at Harper Adams University, the Academy's higher education partner. The weekly 'extension activities' – a range of extra-curricular activities available for one afternoon a week throughout their time at the Academy – also help to build this culture.

One of the most distinctive features of the Academy is that staff have the chance to know the students more accurately than is usually possible in most school contexts. Some of this derives from the Team Leaders' 'snapshot walks' and the fact that teaching is arranged in teams, so that staff have a chance to observe and to feedback to the student later on what they have noticed:

'You get to see those who struggle in one subject absolutely excelling in another. You get to see them doing things that you couldn't do and so the praise you can give, saying to them, 'I couldn't do that – I couldn't use a hot wire laser cutter – I don't have the technical acumen to do that' ... That can set up a really useful dialogue about the skills that they might need to be better in your subject – it's a nice opener.' (Team Leader)

Knowledge of each student is also rooted in the role of the Learning Mentors, who engage with their group of students across a full range of learning and social contexts. A typical comment from a student was:

'Staff know us as people; we don't just feel one of a crowd.' (Year 11)

Another student said of discussions with teachers:

'They are more of a friend: they don't just tell you what to do; they say: 'Think about this; think about that.' (Year 11)

A typical remark from a Year 10 student was: 'Our mentors know us best. We can talk freely with them.' This knowledge is gained by the regularity of meetings with mentors,

who are present in many of the teaching sessions and also have daily lunch with their group. (In general, students were very positive about this: 'We always save a seat for her at lunch.') Mentors also meet with each student individually once a week to discuss progress.

Both students and staff told us that detailed record keeping about students and their progress is another key feature of the Academy and that, through regular feedback, it underpins the positive relations between staff and students. The advantages of this routine of record-keeping linked to feedback came through strongly in the student interviews. The most obvious of these is the tracking of student progress, through student target setting with regular and frequent reports home to parents. Students are given 'tracking grids' to show them where they are in their academic work and this is reinforced by the issuing of continuously revised predicted grades. In addition there is peer assessment and a continuous formative testing regime. All this permits the Academy to run a system of target setting that is strongly personalised



and evidenced-based. Many of the students we interviewed seemed very self-aware with a clear idea of their capabilities, weaknesses and what they currently needed to work on. Finally, struggling students are quickly identified and sessions organised to support them.

Detailed feedback about students' progress is systematically communicated to their parents, but only after it has been talked through with the students, reinforcing an ethos of trust in the institution. Students reported that the regular receipt of reports home by email, or post as appropriate, led to more discussion at home with parents about academic progress. As one student remarked about the e-mailed reports, it meant that you 'couldn't just stick it in the wardrobe and avoid a discussion!'

The latest HMI inspection report on the Academy (HMI, 2014) commented on the high standards of behaviour in the Academy. The overall judgement of the students we interviewed was that the Academy was strict and that behaviour was good, certainly better than in most of the previous institutions attended by the students. As one student observed: 'Troublemakers are more likely to calm down given the general atmosphere of the school.' Our evidence suggests that the Academy has been able to establish a relatively strict behavioural regime combined with a student-focussed collaborative culture which generally wins student consent and helps to produce good academic results. For instance, students are expected to wear formal 'business

dress' including suits for the boys. In general they approved of this requirement and saw it as part of the business-relevant ethos of the Academy.

Students in the Academy are organised into three Houses. Competition is encouraged between the Houses in both academic and other areas (including behaviour) through a points system. The results of this competition are regularly updated and publicised throughout the Academy. We received mixed views from the students about the practice of the system. From the student perspective there appeared to be two main issues. The first was an issue about equity. It was claimed that how you were treated, particularly in terms of behaviour but also in terms of academic work, depended to an extent on which House you were in. Students were particularly energised by the lack of consistency and equity in terms of the application of supposedly Academy-wide rules, such as the rules about the use of mobile phones. The evidence was sufficiently widespread to lead us to the view that it had substance. The operation of the points system also seemed to have differential effects in the different Houses. The second issue raised by the students was that the Houses were very self-contained; indeed most students felt that they were too self-contained. As one student put it:

'You do not get to see anybody in the other Houses because of the way breaks and lunchtimes are organised.' (year 11)

We understand that this particular aspect is the result of a lack of space

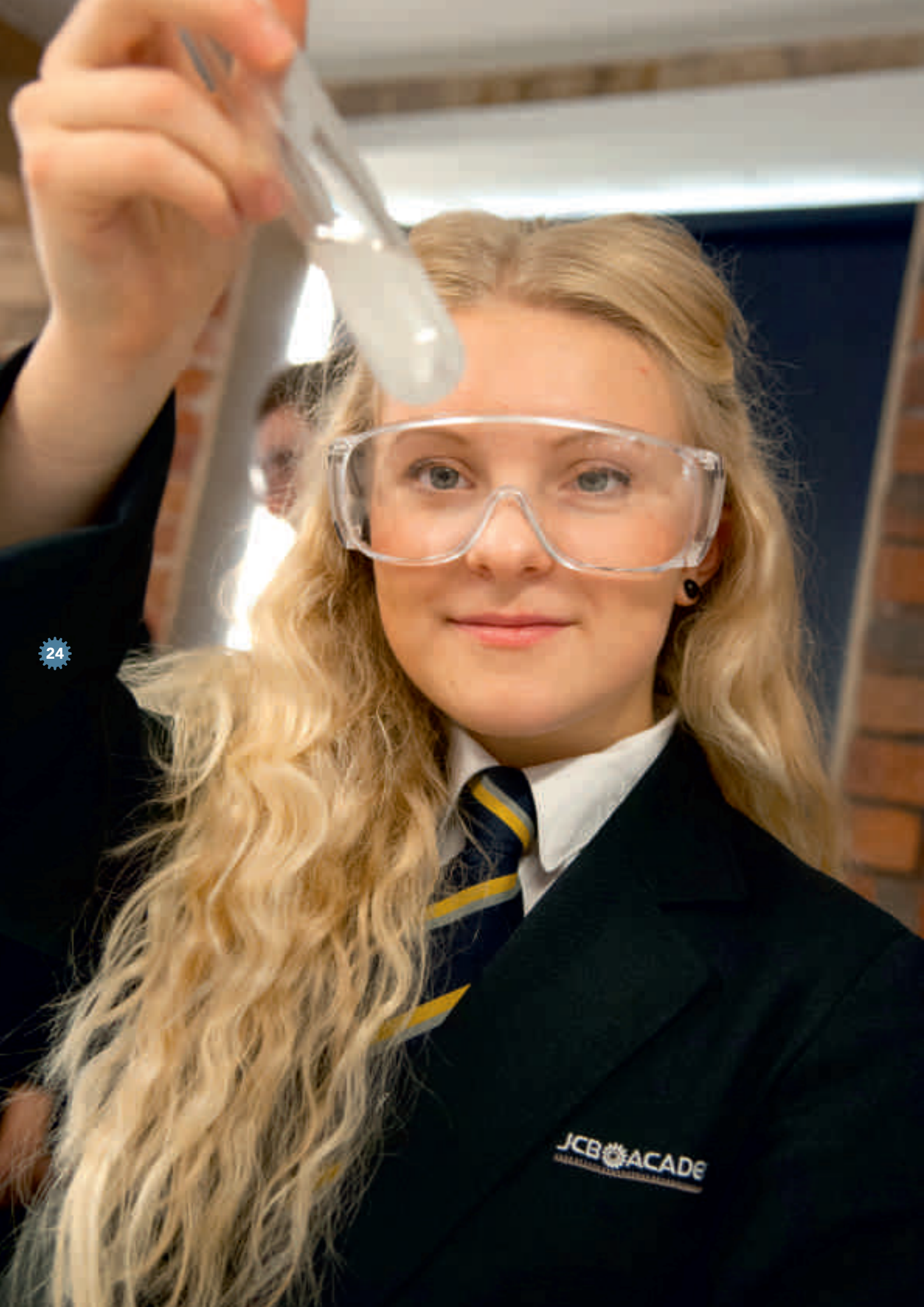
in the Academy and not the result of deliberate organisational design.

One of the Houses was all male and this raised a more general issue for the students we interviewed. Over 90% of the students at the Academy are boys. This is not wholly surprising given that the Academy's focus on Engineering and the very low proportion of female engineers in the UK. The students were not slow to comment on this phenomenon. One student summarised:

'Girls are a rare species round here – that's a bit weird.' (Sixth Form student)

The decision to concentrate the girls in a smaller number of houses did mean that they were in less of a minority in teaching situations. Several girls mentioned that both mentors and technicians recognised that they might need greater support, particularly in workshops where they tended to have less experience than the majority of the boys. One or two of the girls mentioned that there was no shortage of good role models amongst the female Engineering and Business staff. Where the girls had issues was in the provision of PE and the extension activities on Wednesday afternoons. Both were thought to be very male-oriented.

Whilst it is the case that the engineering industry, particularly mechanical engineering, is very male dominated, this is not the case for the business sector and business studies. As the Academy expands its Business stream there should be opportunities to adjust the student gender balance.



Issues and dilemmas for The JCB Academy

Meeting expectations: balancing accountability demands

Despite the success in creating a new institution which is genuinely innovative there are inevitably some difficulties. One of the obvious ones is that, in an era where school league tables dominate the public discourse, it is very important that the Academy is seen to be conventionally successful in producing good academic performance in the core subjects. The OFSTED inspection evidence suggests that this is happening without compromising the performance in Engineering, which is rated by the Inspectorate as 'exceptional':

*'The exceptional learning in the engineering and technical lessons is underpinned by teachers inspiring students with their professional experience and deep knowledge of the engineering and business industry.'*¹⁵

Pressures on staff

The interview data with staff suggests that they believe that the significant pressure placed on them to ensure that the students achieve good results is the main reason for what they see as a lack of time given to curriculum planning. This pressure, coupled with ways in which teaching is organised and the length of the Academy day, leads many staff to comment on their work-life balance. A few staff think that the

pressure is unreasonable. One suggested that a regular complaint was:

'We are being used and abused, worked really hard so they can get good results.'

We found it interesting that the staff recruited from industry, as well as finding teaching more complex and demanding than they had imagined, also felt that the workload was very high and indeed argued that it was generally higher than in their previous jobs in industry. The interview data suggests that this is because of the nature of teaching, particularly in the way it is organised at the Academy, where very long periods of time are spent 'on show' with the students. One recruit from industry remarked that it was not possible to have time to yourself even for five minutes. A quiet cup of coffee during the working day was a thing of the past. Even lunch times are spent with the students. One of the consequences of the long teaching days on three days of the week is that staff are anxious to leave at the end of the day, which makes after school staff meetings very difficult. A significant number of staff held the view that this pressure of work led to a situation where 'there is not enough reflection time amongst the staff'. When this organisational model is coupled with the constantly shifting school external educational environment, particularly as regards curriculum

and assessment, then planning becomes exceptionally difficult. One Engineering Learning Mentor (ELM) observed:

'Constant change is the enemy of planning. You learn that time spent planning is not worth it.'

Staff turnover

The Academy appears to have a high staff turnover; certainly that was the view of the majority of staff to whom we spoke. The high turnover of staff was also mentioned by our business partner interviewees. Staff suggested that this turnover was one of the reasons leading to great pressure upon remaining staff, when replacements were not immediately forthcoming and experience was lost. Two other reasons were offered for the staff turnover. First there were the pressures of working in the Academy and the resulting strains on work-life balance. One interviewee

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said, 'a lot of staff are going back to 'normal' schools' (ELM). Another suggested:

'It's hard work; you couldn't do this job for more than four years – you would be burnt out.' (ELM)

But there is also another more flattering possibility to account for the high turnover. It is simply that the Academy offers invaluable experience in a new model of vocational education which is gaining a reputation for innovation and effectiveness. This makes the Academy staff potentially very attractive both to other schools and to industry. We were told that quite a few staff have left to take up appointments in industry, which, as well as their technical skills, values the experience of – coaching, developing, mentoring, managing – they have gained in education. Staff turnover at the Academy was the one note of caution that we encountered from the industrial partners. Some compared the 'rate of churn' of Academy staff unfavourably with that in their own companies and said

that they thought that the Academy needed more staffing stability so that the relationships vital to an organisation's success could be retained.

Modern foreign languages

Quite a few of the students we spoke to seem to have an issue with modern foreign languages and we noted that the latest OFSTED Inspection report observed that 'progress in modern foreign languages is slower than in other subjects'¹⁶. There are several issues here which we think are worthy of comment. The first is the Academy's decision to focus on German. The justification for this appears to rest on the belief that in terms of modern foreign languages, German is the language of science, engineering and industry. Whilst it can be argued that Germany has Europe's most powerful manufacturing sector which extends beyond the giants of Bosch, and Siemens to its Mittelstand of SMEs, this does not seem to be a particularly compelling argument for making German the main foreign language of the Academy, particularly as the majority of those young people joining from other schools are more likely to come having studied French or Spanish.

The problems of German are exacerbated by the fact that German does not seem to have been scheduled into standard timetable slots with the result that students are consistently withdrawn from German lessons for other purposes. We understand that the Academy is now offering Spanish as well as German.

Post-16 provision

Sixth Form and Apprentices

We interviewed two small groups of Sixth Form students, who had joined the Academy from other schools, as well as two small groups of apprentices. These interviews took place relatively early in the 2014-2015 school year.

Since its opening in 2010, the Academy has brought a sharp focus to the task of establishing a radical organisational model suitable for the 14-16 cohort. The evaluation team recognised that in 2014-2015, post-16 provision at the Academy was in its very early stages, so that the Academy would need to bring a similar focus to establishing the nature and culture of its post-16 provision, whilst at the same time considering carefully how this might best articulate with its 14-16 provision.



¹⁶ OFSTED Report – 7-8 May 2014

Summary of case study conclusions

As indicated in the opening section of this report, we used a framework for our evaluation which was derived from Richardson and Wiborg¹⁷. This framework provided ten key questions, which form the basis of our conclusions.

Can The JCB Academy convince its partner companies to sustain on a long term basis their commitment of time and energy to the Academy?

There is no doubt that The JCB Academy has been very successful in acquiring business partners. All the indications are that the partner companies see this as a long term relationship. The evaluation revealed the features of these relationships that seem to us crucial to this success: senior managers in the companies maintain a continuing involvement with the Academy; key industrial players have taken an active role in recruiting other business partners; business partners focus on areas of work in which they have specific expertise; employees of these companies take active roles in designing and delivering significant aspects of the Engineering curriculum in partnership with Academy staff; employees of these companies continue to work together with Academy staff to adjust the content of the Challenges as appropriate and help facilitate the delivery of the challenges; the benefits of the relationship are acknowledged as flowing in both directions and are supported at the highest levels in all the companies.



Will those companies and others value and employ the graduates of its programmes?

The JCB Academy had its first student intake in 2010. Early indications of the outcomes they have achieved are encouraging. The evaluation team consistently picked up comments from both the industrial and university partners about the emerging qualities of the students at the Academy: they noted their confidence, social maturity and capacity to work in teams as well as the specialist skills and knowledge they were acquiring through the Academy's particular approach to learning.

The Academy will be under increasing pressure to increase its apprentice programme - in 2014-2015 this was already underway, with a wider of range of companies'

apprentices being recruited. The key challenge here will be to see how this programme can be more effectively connected to the rest of the Academy's offer, rather than being seen as something entirely separate, which appears to be the current model. If the Academy's assertion that it replicates for its students aspects of the workplace environment is to ring true, then some kind of interplay between students and apprentices is desirable. Certainly a model based on three levels: KS4; KS5; apprenticeship – with continuity and progression between them would be valuable, though it would need to recognise the different ages at which people enter apprenticeship programmes.

¹⁷ Richardson, W. and Wiborg, S. (2010), English Technical and Vocational Education in Historical and Comparative Perspective: Considerations for University Technical Colleges, London, Baker Dearing Trust.



In the market place of secondary education will a large enough cross section of parents and their children opt for this model of education?

The Academy's relatively rural location means that many students have daily to travel an appreciable distance. Despite this, the Academy has not experienced difficulty recruiting students.

There was evidence that the Academy is now being identified by some parents as offering their children a better chance of success than their previous school – some parents see this in terms of career prospects; others in terms of motivation to learn and greater engagement. Some students told us that they had not enjoyed, or were struggling with, their academic work in their previous schools. Others said that they – or their parents – had been unhappy with the standards of behaviour in those schools. The Academy has achieved good academic results for its students to date, and seems to have gained a reputation amongst local parents of potential recruits for both academic achievement and social

development. These are clearly encouraging signs.

Is 14, rather than 11 or 16, the right age to start a technical and vocational education pathway? Will the narrowed focus of the curriculum be an impediment to university entrance and/or subsequent employment?

There are several considerations here. First, by starting at 14, UTCs have to persuade young people to leave their existing secondary school and their established school friends. One consequence of this, which we picked up from the student interviews, is that The JCB Academy is inevitably recruiting some students who are struggling and/or disenchanted with their existing school. This suggests that students who are enjoying their existing school, and progressing very well there, are, for the most part, less likely to transfer to the Academy.

The second issue concerns motivation. It could be argued that, for a 14 year old, the curriculum at The JCB Academy is unhelpfully narrow. Courses leading to qualifications in the

humanities are restricted to English and the study of a modern foreign language. There is a complete absence of arts subjects, though the prospectus list of extension activities does include unspecified activities labelled 'Art' and 'Music'. But for most of the students we interviewed, the particular mix of learning experiences works. Achievement in school is a function of engagement, as well as ability and effort. It is linked to the appropriateness to particular students of the learning styles used. We have clear evidence from the evaluation that most of the students we interviewed were motivated not only by the specific focus on Engineering, but also by learning through an experiential model which provides convincing challenges from real-life situations and offers regular, meaningful contact with the world outside school. The recent and varied employment experience of its teaching staff was a significant factor in helping to convince students that what they were learning at the Academy had meaning and relevance to their future lives. There is a positive learning culture, which is supported

by the level of engagement expected from students, and the authenticity of the relationships between staff and students. In interviews, some previously low-achieving students made clear that, because they experienced the staff's determination that they would succeed, their own determination to do well was strengthened. All this, combined with an organisational structure which supports personal growth, has a significant effect on students' motivation and on their subsequent performance.

Can The JCB Academy construct and sustain a new organisational and pedagogic model of schooling which will motivate and engage its students and produce high standards of academic and vocational attainment?

The evaluation demonstrated to our satisfaction that The JCB Academy has constructed a model of schooling in which both the social experiences provided by the school and its pedagogy undoubtedly engage and motivate the vast majority of its students most of the time. The satisfaction levels of its students are high and their achievements impressive. The 2014 OFSTED inspection also confirmed that there were outstanding achievements in Engineering and praised the academic achievements of its students. Our view is that for some students it has proved beneficial to transfer to this new educational foundation which has established innovative ways of organising learning and teaching.

What are the qualifications and attributes that will prove to be necessary in the staff of The JCB Academy? Are there enough

suitably qualified and committed staff to enable the Academy and to realise its vision?

The staffing of The JCB Academy presents a very interesting blend of qualified teachers and staff from different professional backgrounds, some of whom have been recruited directly from engineering and/or business. Many of the teachers have a strong sense of mission. Some of the teachers with Qualified Teacher Status (QTS) also have relevant employment experience gained outside of education. Teachers in core subjects all have QTS. This mix of staff works extremely well – and is especially useful in the Engineering and Business area of the Academy. The student interviews repeatedly confirmed that students valued the wide range of expertise and experience that the staff possessed. Two other characteristics of teaching at the Academy are important in creating the distinctive pedagogic approach. First, the Academy looks for staff with a willingness to adapt teaching strategies and learn from others, and in our perception the contributions from those with teaching backgrounds and those from industry were well balanced. Secondly, the widely used strategy of team-teaching reinforces a questioning and flexible approach and helps sustain the development of pedagogy at the Academy. Visits to the Engineering projects (Challenges) by staff teaching core subjects and by company representatives also help.

Many of the staff with an industry background expressed an interest in gaining QTS, and some were working on this through University based PGCE programmes. Our

view, in line with Recommendation 17 in the Wolf Report¹⁸, is that the Qualified Teacher Learning and Skills qualification taken by staff in FE Colleges might be a more appropriate qualification.

The pedagogic model has helped build enthusiastic and committed teams at the Academy. This has paid rich dividends to the students, but some staff interviewed felt that they would have liked more opportunities to be engaged in the management and planning of the Academy. It may be almost inevitable that the first UTC would have a somewhat 'top down' approach to management and planning because the stakes were so high and there was very little experience on which to build. Now that The JCB Academy model has been shown to work, the senior team recognise that it is probably time to engage staff more fully in helping to plan the future strategy and management of the Academy.

By and large the Academy has not had difficulties in recruiting staff. It has built a good reputation, has no discipline problems, and has an excellent well-equipped building. However, it has an issue about staff retention. We have already suggested that one of the reasons for this relates to its success: its staff do not find it difficult to get promotions in other places. Interviews with the staff suggest that another reason for the high turnover is that the demands of the job are higher than one might expect of similar positions in both schools and business. Our view is that these high demands are at least partly a function of being a new institution trying to operate in a very

¹⁸ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/262819/Wolf_Recommendations_Progress_Report.pdf



different way, so that the pressure and determination to succeed are also high.

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The constant changes in government policy on curriculum and assessment have added to these pressures. If this analysis is correct then one might expect pressure on staff to lessen over time as routines are established and good results continue to be achieved. The danger is that the Academy will react to the current high turnover by reducing the demands on staff, damaging some of the key features of the Academy: for example the high quality and frequency of feedback to students and their parents.

Is the school qualification system sufficiently flexible and stable to accredit appropriately the model of education championed by the Academy and is the qualifications model likely to be acceptable to both employers and higher education?

In the beginning Academy staff established an effective partnership with an examination board to create a suitable assessment model for its Engineering and Business curriculum. Acceptable solutions were reached, but were quickly swept aside by government curriculum and assessment reforms. This is a difficult area partly because of the vocational-academic divide which has long been a marked feature of English education. On the one hand various reforms have had the effect of unhelpfully pushing the vocational in an academic direction. On the other hand many vocational qualifications have been very narrow and have not found a ready acceptance with employers – a state of affairs revealed with much effect by the Wolf Report¹⁹.

We know that high stakes assessment systems have a very strong influence on both the curriculum and teaching. The JCB Academy is in a potentially difficult situation with its desire

both to emulate industrial practice and enable young people to gain qualifications that will be acceptable to higher education, which has traditionally been reluctant to accept narrowly vocational qualifications. However, influenced by OFFA (Office for Fair Access), many universities are now increasingly willing to accept students with vocational qualifications and experience.

It is tempting to argue that the distinctive education offered by the Academy, and hopefully by other UTCs, requires a distinctive qualification, but the education scene is littered with failed attempts to do this. One hope is that a successful UTC movement, which entails developing acceptable models of vocational education suitable for 14-19 years olds, will provide a platform for the emergence of distinctive qualifications which have proven use and exchange value. The JCB Academy looks to have played its part in starting to build this platform.

Will government provide The JCB Academy with a stable funding framework which will allow it to fulfil its stated objectives?

As a UTC, The JCB Academy is funded on the same basis as other secondary Academies. However, there are several respects in which the Academy is not like an 'ordinary' secondary school. First, there is 40% more teaching time than in other schools – with long blocks of time for teaching and an extended school day. Secondly, Engineering is an expensive discipline to teach. There is a high consumables budget and much of the equipment

¹⁹ Review of Vocational Education - The Wolf Report - 2011

requires specialist servicing and repair work which needs to be bought in. Although it is our view that initially some of the Academy's sophisticated equipment may not have been essential to its needs, that equipment will depreciate and newer, probably different, equipment will be needed. There is currently no financial provision for this. Thirdly, The JCB Academy has fewer students than an average secondary school, so total capitation funding is lower.

There are other special features of The JCB Academy which result in significant extra costs. First, there is the building: a stunning blend of the historic Arkwright Mill and the new glass and steel building of high quality. Staff, students and visitors alike all remark on what an inspiring and effectively functional building it is:

'The building itself can be used as a teaching aid – walking through it you walk through a timeline, in materials and construction techniques, not just design – and then of course there's its place in the industrial history of the locality.' (Engineering teacher)

But such buildings can be expensive to maintain and repair. Then there is the location of the Academy and the financial consequences that follow. Because the Academy is located in the village of Rocester, within walking distance of the JCB

headquarters, almost all of the students have to be transported to the site and the costs of this travel are significant. Initially central government paid the transport costs. After a period of time the government decided that parents should contribute 50% of the costs. In the near future the Academy will have to fund the entire cost. One of the Academy's senior management team described this as a looming financial crisis which could only be solved by cutting staff.

If the Academy increases the number of apprentices it trains, and there would appear to be significant demand for them to do this, then this might go some way to helping it to balance its finances, although it is to be hoped that this does not become the main driver for involvement with apprentice training. As we have already argued, in order for this to be successful whilst at the same time preserving the key features of the 14-16 curriculum, the Academy will need to give more thought to how apprentice training fits alongside its mainstream activities.

Is the location of The JCB Academy helpful? Does it have the buildings and equipment which are appropriate for this form of education?

The initial location of The JCB Academy helpfully signals the close

connections between the Academy and JCB. Housing the Academy in a historic Arkwright Mill, with modern extension, was a stroke of genius. However this has inevitably meant that the Academy needs to attract students from a widespread catchment area, resulting in long journeys and long days for many students and a large transport bill for the Academy. The initial assessment of equipment needs may have been over-ambitious and maintaining equipment at that level may also prove to be an unhelpful financial burden.

Will higher education institutions be willing to assist The JCB Academy in its mission and will outgoing students gain ready admission onto undergraduate programmes?

The specific university partnership has been very beneficial to The JCB Academy. The initial residential experience helps to signal a shift to a more mature social context. It also signals a different approach to learning: the model of learning successfully championed by the Academy – student-centred and with the onus placed on the student to actively search out answers to problems. This approach is much more consonant with university practice than the more teacher-centred model prevalent in many schools.





Wider observations

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In our evaluation of The JCB Academy, we found much to celebrate. It is a thoroughly innovative institution which embodies the coherent and consistent vision that drives it. It has sustained, committed and active support from its partners, both in industry and higher education. It is thoughtfully and energetically led. Its distinctive curriculum is responsive to the espoused interests and current enthusiasms of both its students and its partners. The Academy has high expectations of its staff and its students. It has built a culture which helps them to meet those expectations. Learning takes place in a context where students meet with, and learn from, a wide range of adults, who bring with them – and share – a rich and varied experience of working life. Students learn in a social environment which supports their personal and social development, as

well as their academic achievement. For instance, when students work in teams to tackle challenges derived from real-world, work-based problems, they acquire technical skills and know-how; they also learn more about how to manage themselves and co-operate with others.

In some ways recognising the extent of The JCB Academy's achievements through a case study of this single English 14-19 school leads us back to long-standing anxieties. In the most recent of the long line of government-commissioned reports on vocational and technical education in England, its author, Professor Alison Wolf argued:

'We need to make sure that vocational education for 14-19 year olds really does serve the purpose of creating and maintaining opportunities for all young people.'

She also noted that:

'The overarching problem was encapsulated for the Review by Professor Lorna Unwin: "England always has great examples of good practice, but we don't have a good system."'²⁰

Our anxieties are at this system level.

Since the founding of The JCB Academy in 2010, the number of UTCs has grown. By July 2015 30 UTCs had opened. 20 more are due to open by 2016. Of the first 30 UTCs, by July 2015 nine had been inspected by OFSTED. One – the Reading UTC – was judged to be Outstanding. Three – Aston University Engineering Academy; The JCB Academy and Silverstone UTC – were judged as Good. Three were judged as Requires Improvement and two as Inadequate. Of this five, two – Hackney UTC and the Black

Country UTC – have now closed. The OFSTED response therefore suggests that the performance of UTCs is mixed. However a case could certainly be made to suggest that there is now a UTC ‘movement’. In the run up to the last election in 2015, all the main political parties seem to have supported the expansion of UTCs.

School choice in England is an important and complex issue. On the ‘demand’ side parents and their children are anxious to choose the ‘right’ school and are normally asked to rank their preferred options. On the ‘supply’ side recent governments have tried to encourage schools to become more distinctive in order to offer parents and students at least a semblance of choice. More ‘choice’ would appear to be on the way. In August 2015, *The Independent* published an account of an interview with Lord Baker²¹, speaking on behalf of the Careers Colleges Trust²², in which he confirmed a plan to open a network of 25 Careers Colleges within four years (two are already open). Careers Colleges, based within FE Colleges, take advantage of the ruling, in place since September 2013, that:

‘General further education colleges and sixth-form colleges have been able to enrol, and require direct funding from the Education Funding Agency (EFA) for 14 to 16-year-olds who wish to study high-quality vocational qualifications alongside general qualifications including English and mathematics within the Key Stage 4 curriculum.’²³



Meanwhile the UTC movement continues to be presented by the Baker Dearing Trust as an expanding network:

‘Whether you are a university, employer, local council or any other institution or individual interested in starting up a University Technical College, Baker Dearing Educational Trust would love to hear from you.’²⁴

Designated by the DfE as both academies and Free Schools, UTCs are also linked, in a recently updated DfE Policy Paper, with Studio Schools:

‘In 2011, the Education Secretary went on to invite proposals from groups interested in establishing UTCs and studio schools. UTCs and studio schools are academies for 14- to 19-year-olds. They are backed by employers who help tailor the curriculum to make sure young people are equipped with the skills that will prepare them for the world of work.’²⁵

UTCs and Studio Schools do arguably present one of the more distinctive choices in secondary education. As 14-19 schools, they require prospective students to make a conscious decision to leave their existing secondary school and follow a vocationally-orientated route linked to the specific specialisms of the UTC or Studio School that is within their reach geographically. There are currently 36 Studio Schools, with plans for a further nine. The Studio Schools Trust promises that they offer ‘a bold new approach to learning’ as well as ‘a smaller, more personalised learning environment’, in that it is the intention that they remain small, with no more than 300 students.²⁶

The continuing development of the idea that parents and their children should be given significant choice in selecting from amongst different educational offerings means that UTCs will in some areas face even greater competition in the future. If each UTC is designed to occupy a

²¹ The Independent – 19.08.15

²² www.careercolleges.org.uk/

²³ <https://www.gov.uk/government/publications/enrolment-of-14-to-16-year-olds-in-full-time-further-education/full-time-enrolment-of-14-to-16-year-olds-in-fe-and-sixth-form-colleges-academic-year-2015-to-2016>

²⁴ <http://www.utcolleges.org/about/starting-a-utc/>

²⁵ Policy Paper 2010 to 2015 Government policy: academies and free schools - Updated 8 May 2015. <https://www.gov.uk/government/publications/2010-to-2015-government-policies-academies-and-free-schools/>

²⁶ <http://www.studioschoolstrust.org/node/124>

specialist vocational niche, and if it will be financially viable for them to remain smaller than most secondary schools, then this of course may not matter, but in the marketplace of secondary education, UTCs may be forced to expand their recruitment in order to remain financially solvent.

Given the diversity of provision at the upper secondary level, it is unsurprising that school funding arrangements still appear complex, despite government attempts to move towards a national funding framework that is 'fairer, simpler, more consistent and transparent'²⁷. The current differential between the funding provided for the education of pre-16 year olds and post-16 year olds is particularly relevant here. A recent study by the IPPR suggests:

'Our analysis shows that the budget for 5-15 year olds has increased in nominal terms by 13.5% between 2010/2011 and 2014/2015, while

the budget for 16-18 year olds has decreased by 9.1% in nominal terms over the same period.'²⁸

As part of this scenario, to boost their financial position, UTCs may need to become involved with delivering apprenticeships, as The JCB Academy has done, and that may prove difficult to manage without undermining some elements of the 14-19 ethos that they are seeking to establish.

Whilst being impressed with the achievements of The JCB Academy, we need to caution that it might be the case that, as the first UTC, The JCB Academy has some 'first mover' advantages which could be difficult to reproduce elsewhere. There is evidence that one or two other UTCs have had problems recruiting students, particularly in dense urban environments where there is a lot of competition from other schools, which may, for instance, already have

well-established and broadly-based business partnerships. There are also:

'Many stories of schools being reluctant to let young people move to a new institution for the start of Year 10. We have been told of schools refusing UTCs access to Year 9s and their parents to explain their offer; of UTCs having to invest in huge marketing campaigns or targeting parents at sponsoring employers in order to spread news of their new school; of schools recommending a change of institution only to those students who they are keen to 'offload' for behavioural reasons, with the risk of turning some UTCs or studio schools into 'dumping grounds'.²⁹

So, if the UTC network is to continue to expand, then a number of questions need to be addressed. Perhaps the first is about the planning processes used



²⁷ DfE (June 2013) – 'School Funding Reform: findings from the review of 2013-2014 – arrangements and changes for 2014-2015'

²⁸ Evans, L. (2015) 'Moving on up: developing a strong, coherent upper-secondary education system in England' IPPR, p27.

²⁹ Evans, L. (2015) 'Moving on up: developing a strong, coherent upper-secondary education system in England' IPPR, p45.

to determine the locations and extent of the UTC network. We were unable to find any discussion of this issue in the UTC literature. The model seems to be to encourage UTCs to be formed wherever they can acquire what are seen as the major ingredients: land and buildings; a university partner and business partners. Once these ingredients have been found, and DfE consent has been given, a UTC enters the education market mix of the local area. Perhaps this approach has contributed to their current 'mixed' performance. A more planned model would take careful account of the possible impact of the chosen location on existing schools, including other UTCs, Studio Schools and FE Colleges – more of which will now, perhaps seek to launch their own 'Careers Colleges'.

There is also the issue of sector specialisation. Is it only in areas where a specific industrial sector is already strongly represented that young people can be given the chance of a vocational education relevant to that sector? How might young people who want to make an early choice of a distinctive, vocationally-orientated form of education be guaranteed a wide range of options responsive to their needs and enthusiasms, wherever they live? This is an argument for a more holistic approach to policy making, for:

'A new relationship between policy actors at national, regional and local levels as they jointly act in stewardship to develop and nurture opportunities and work together for greater social justice within the local spaces in which young people

attempt to envisage and create their futures.'³⁰

All this prompts another question: how appropriate for young people is a change of institution and a choice of vocational direction at 14? (As we have seen, the Careers Colleges have been made possible by the government's decision to allow FE colleges to take full-time students at 14.) In the English education system currently – as in other areas of young people's lives – 16 still seems a more logical breakpoint and also a point at which it might seem more realistic to ask young people to make an informed choice of vocational direction. This is partly because of the continuing focus on GCSE attainment as the launching pad for each individual's future success. It looks as if the idea of 16 as a key turning point is likely to be further reinforced by the EBacc and Progress 8. Nick Gibb, Schools Minister, argued, in a speech in June 2015, on 'the social-justice case for an academic curriculum' that the EBacc is an essential prelude to the choice of 'high-quality vocational education after 16':

'This isn't a debate between academic subjects on the one hand, and vocational qualifications on the other. It's about ensuring that all school children up to the age of 16 are properly educated in those academic subjects that best equip them for their future; either for high-quality vocational education after 16, or further academic education until ultimately going on to engage in training for a vocation.'³¹

As we found at The JCB Academy, a break at 14 does enable some young people to escape from a



school in which they feel they are not flourishing. It does provide those who have a clear sense of vocational direction, and who happen to live in a locality where there is an appropriate alternative institution – to which they are lucky enough to gain entry – a chance to specialise. Would a better response to the problems that some 14 year olds experience at school be to seek ways to make all schools more suited to serve all pupils till 16? As The Wolf Report³² asserted:

'For young people, which vocational course, qualification or institution they choose really can be life-determining. 14-19 education is funded and provided for their sakes, not for the sake of the institutions who provide it. This may be a truism; but it is one which policy too often seems to ignore.'

Another possible reason for questioning the wisdom of UTCs targeting the 14-19 age group relates to the idea of university partnership. The UTC website

³⁰ Hodgson, A. and Spours, K. (2015) 'An economic analysis of the dynamics of localities: a 14+ low opportunity progression equilibrium in action' *Journal of Education and Work*, 28, 1, p41.

³¹ <https://www.gov.uk/government/speeches/nick-gibb-the-social-justice-case-for-an-academic-curriculum>

³² Review of Vocational Education – The Wolf Report – 2011



suggests that the university partner plays 'a central role in the development and running of a UTC'³³ and offers as specific examples of elements of that role: 'providing teaching staff to help in specialist subjects, such as maths for engineering' and 'providing individual mentors for students'. It would be useful for established UTCs to gather evidence to illustrate the various possibilities of this relationship. For some years now universities have been involved with schools in a range of out-reach activities. How different is their relationship with UTCs? We suspect that the real dividends of a university partnership might come in the post-16 curriculum. Students below the age of 18 pose special problems for universities in terms of safeguarding. University campuses are not designed and set up for students below the age of 18.

Taking on apprentices is proving

to be a useful source of additional income for UTCs. Although the culture of a small 14-19 institution might not at first seem completely appropriate for young people already accustomed to the culture of the workplace, is it possible that the presence of apprentices bring additional benefits? For instance, might their initial work experiences be shared?

The JCB company played the key role in initiating, funding and supporting the establishment of The JCB Academy. Its role continues to be pivotal, for instance, in helping to recruit other business partners. This prompts the question of whether an 'anchor company' is a vital ingredient of business partnering – and whether each region can provide such a partner, with the required motivation, commitment and capacity. A further question for future UTCs is whether business partners are inevitably

large companies which have the capacity, because of their size, to make a significant contribution to the curriculum. Worryingly, our interviews with The JCB Academy's business partners suggested that under current DfE rules, with the withdrawal of enhanced funding, even large companies would find it less easy to commit their support. With this background, how might SMEs best be encouraged to be engaged? What might need to be done to attract SMEs to support the UTC model?

The above remarks represent notes of caution about the future development of UTCs. This is not to deny that individual UTCs may well provide young people with an excellent starting point, which would not have been available to them elsewhere. We found that some of the most positive features of The JCB Academy were linked to its use of teaching teams in which

³³ <http://www.utcolleges.org/about/universities/>

³⁴ Fejes, A. and Köpsén, S. (2014), 'Vocational Teachers Identity Formation through Boundary Crossing', *Journal of Education and Work*, 27, 3, pp.265-283.

there are some individuals with a relevant, varied and interesting career background, but without – as yet – a recognised teaching qualification. The role of some of these unqualified staff is that of para-professional, supporting qualified teachers. Others are in a teaching role. England may be out of line with the rest of Europe in allowing staff without a teaching qualification to teach in schools such as UTCs. Nevertheless, our case study illustrates how, where these teachers are given the right support, this can be an effective strategy. At The JCB Academy, the use of professional engineers, and others, working alongside qualified teachers, has proved to offer a powerful boost to learning – to personal learning and development as well as to vocational learning. There is some evidence from other countries that when vocational teaching manages to draw on both occupational and educational cultures it can be very effective, for instance a study in Sweden found that:

*'The vocational teacher needs to have both an identity as a teacher and an identity related to the occupation about which he or she teaches.'*³⁴

Based on their case studies of vocational teachers in one School Board in Canada, researchers from the University of Leeds have argued for policies in England to support:

*'The opening of new pathways for those who become school teachers and support for them to bring their industrial experience into the school curriculum.'*³⁵

We found at The JCB Academy that, through their encounters with such staff, not only did students have access to recent and relevant workplace skills, but also that the presence of such staff in teaching teams helped the social development of young people by bringing into the learning dialogue a convincing understanding of the world outside school.

Another question, which a single case evaluation study is not able to answer, is to what extent the UTC model is likely to be successful in its wider goal of enabling its students to secure appropriate employment. Certainly it is too early to provide any reliable evidence of the success of the UTC model, as expressed through the wider UTC network, in securing, long term, better career outcomes for its graduates. There is a group of institutions in the USA, the Career Academies, which share some of the characteristics of UTCs. The New Jersey 'Career Academy' magnet schools were specifically recognised by Richardson and Wiborg³⁶ as offering a close parallel to the English UTCs, since they are

separate technical 14-18 institutions 'to which students transfer from neighbouring junior high schools' and a 'small niche sector, rather than a model for wider emulation.'³⁷

There is however another much larger group of Career Academies in the States. These Career Academies have been established for over 30 years. They are small units which are based in general high schools:

*'Typically serving between 150 and 200 students from grades 9 or 10 through grade 12, Career Academies are defined by three distinguishing features: (1) they are organized as small learning communities to create a more supportive, personalized learning environment; (2) they combine academic and career and technical curricula around a career theme to enrich teaching and learning; and (3) they establish partnerships with local employers to provide career awareness and work-based learning opportunities for students.'*³⁷

There is a well designed longitudinal study of this larger group:



³⁵ Higham, J. and Farnsworth, V. (2012), 'Teachers who teach their practice: the modulation of hybridised – teacher identities in work-related programmes in Canada,' *Journal of Education and Work*, 25, 4. pp.473-505.

³⁶ Richardson, W. and Wiborg, S. (2010), *English Technical and Vocational Education in Historical and Comparative Perspective: Considerations for University Technical Colleges*, London, Baker Dearing Trust.

³⁷ Kemple, J. and Wilmer, C.J. (2008), *Career Academies – Long term impacts on labour and market outcomes, Educational Attainment and Transition in Adulthood*, New York, MDRC.

'The culmination of a 15 year random assignment study of Career Academies in nine urban high schools around the country that has followed students from when they entered high school until eight years after their scheduled graduation'³⁸

The study uses a control group to look at the career outcomes of students in these Career Academies within high schools. A follow up some eight years after graduation shows that graduates of the sample Career Academies had significantly higher earnings than the comparable control group. A word of caution though – the authors of this study warn that, because of the perceived success of these particular Career Academies:

'Over the past 10 years or so... the Career Academy model has been called upon to serve an increasing variety of high school reform goals, and its components have been touted as potential solutions to many problems facing low performing high schools.'

'organizations that support the development of Career Academies have come under increasing pressure to expand the use of the model's individual components with the expectation that elements of the program can produce effects similar to those found in this study.'³⁹

The Career Academies study thus helpfully highlights the hunger for solutions that also characterises the field of vocational education in England. The core features of this Career Academy model might well seem similar to those of UTCs: smaller learning communities, academic curricula combined with career-themed course sequences, and employer partnerships.

In England, we need urgently to identify the criteria for success of our vocational education provision and to evaluate, over the longer term, if UTCs – and their competitors – are proving to be successful, both as individual institutions and in the context of the education system as a whole. If UTCs are achieving

the desired outcomes, we need to be sure what the key elements contributing to that success have turned out to be. We need to find out whether those elements seem to work effectively only in specially designed institutions, such as UTCs, or whether they can also be found in mainstream schools and FE Colleges. We need to ask whether those elements of success can feasibly be made available to all young people throughout England and are sustainable over the long term.

³⁸ Kemple, J and Wilmer, C. J. (2008), Career Academies – Long term impacts on labour and market outcomes, Educational Attainment and Transition in Adulthood, New York, MDRC.

³⁹ Ibid, p57



Appendix 1

The evaluation framework; research methods

The evaluation framework

The framework for the evaluative case study was the range of statements about the intentions and purposes of University Technical Colleges published by the Baker Dearing Educational Trust. In addition we used a study commissioned by the Edge Foundation for the Baker Dearing Trust, which traced some of the history of English technical and vocational education and posed some wider 'considerations' for UTCs.

Our basic question was:

'To what extent has The JCB Academy fulfilled the intentions of the UTC model and how has it tried to do that?'

The evaluation research was carried out during the 2014/2015 academic year and was written up in the summer of 2015. Having completed the evaluative case study, we explored some of the wider implications.

Research Methods

Our basic methodology was first to study a range of information about UTCs,⁴⁰ visit The JCB Academy and hold meetings with the Principal, so that, from this background, we were able to derive questions which could be put to staff and students of The JCB Academy and to its partners. There were four groups of questions: for staff of the Academy; for students, with related questions for apprentices; for industrial partners and for the university partner.

All the questions for each group were drafted and then discussed by the four evaluators until each set had been agreed.

We asked the Academy to select students based on criteria specified by us. Our specifications related to year group, house and gender. We also specified that we wished to see some members of the Sixth Form and some apprentices. The students were interviewed in groups of between three and six. We ascertained that the students had not been specially briefed by the Academy and that who we interviewed was a function of which group was free at the time of our visit. All the interviewees received an explanation of the purpose of the interviews and were given reassurances about confidentiality and anonymity. They were also asked for permission to record the interviews, which all groups gave. Each group interview lasted between 45 minutes and one hour. Some 53 students attended the interviews representing just over 10% of the Academy's 519 students at the time of the interviews.

We selected a sample of 52 staff to be interviewed individually by a member of the evaluation team. They were chosen from amongst the teaching staff, the Senior Management Team and the technical staff – and represented about 50% of this group. We followed the same interviewing protocol with staff as with the students. All staff consented to have the interview recorded. Interviews lasted between 45 minutes and one hour.

The evaluation team also spent a small amount of time observing teaching in the Engineering area and these observation notes also formed part of the data collected on the Academy. One member of the team attended an assembly. At the finish of the staff and student interviews, each member of the evaluation team wrote a short reflective piece on what they had seen and heard about the Academy.

We interviewed staff from three companies which were business partners of The JCB Academy and who had first-hand knowledge of their work with the Academy. In total seven company staff were interviewed – a mixture of senior and operational staff. The same protocols about consent and confidentiality were followed with this group. All managers were interviewed separately by one member of the team and all agreed to have their interview recorded.

Finally we interviewed two members of staff from the partner university following our established protocols. Both interviews were taped.

When all the interviews had been transcribed, all the data, including the reflective commentaries, were then inductively coded by the lead evaluator and a first draft of the evaluation was written up. This was then sent to the rest of the evaluation team for comment and challenge. Following a series of iterations a final draft of the evaluation report was produced. A copy was then sent to the Principal of the Academy for factual checking.

The evaluation followed the research guidelines published by the British Education Research Association.⁴²

⁴² <https://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011>

Appendix 2 - the evaluation team

Professor Ian Jamieson, OBE

As Pro-Vice-Chancellor of the University of Bath, Ian was responsible for all aspects of the student experience, working very closely with the Students' Union. He led on the University's widening participation initiatives and has served on the Board of Trustees of two Academies. In the early 1980s, Ian co-directed the Industry Project, in which most work-related activities in schools today have their origins. He founded and edited the Journal of Education and Work – now the leading international journal in the field.

Dr Lynne Bianchi

Lynne is Head of the Science & Engineering Education Research and Innovation Hub at the University of Manchester. Working with both primary and secondary teachers she has a well-established profile in curriculum development, research and consultancy related to the teaching, learning and assessment of school science and engineering and the development of thinking skills and personal capabilities.

Professor José Chambers, MBE

José is Development Fellow of the Comino Foundation. Until 2010, she was Assistant-Vice-Chancellor of the University of Winchester. Initially an English teacher, she moved to Higher Education to work on a range of projects linking education to business. This work led to organisational consultancy in both public and private sector organisations. In 2007, she directed a HEFCE national project: Enhancing Organisational Development Capability in the English Universities. She is currently a Trustee of the Ideas Foundation and Chair of the Ideas College Trust.



David Perry

David is a Trustee of the Comino Foundation. Fascinated by designing as a mode of learning, David has been a leader in curriculum innovation for 40 years, for instance as Director of the Royal College of Art Schools Technology project in the 1990s. At the University of Winchester, he led the Design and Technology team, which, supported by the DTI Education/Industry Unit, investigated the use of problem solving approaches in both education and business. As a Director of the Technology Colleges Trust, David set up the first national broadband network for schools. Later he supported the enrichment of learning in schools in a number of local authorities through children's ubiquitous access to the internet, notably with Bristol City Learning Centres and Wolverhampton Local Authority.

