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Contents

Introduction: Making the most of employer engagement; what the research tells us.	3
Professor Prue Huddleston	
'Putting skills to Work: It's not so much the What, or even the Why, but How...'	7
Trisha Fettes, Karen Evans and Dr Elnaz Kashefpakdel	
The role of school leadership in increasing engineer employer engagement among teachers	9
Dr Janet Hanson and Professor Bill Lucas	
Employer Engagement: Too little, too late?	13
Dr Maria Turkenburg-van Diepen and Dr Pam Hanley	
Project-based learning in university technical colleges: How are employers engaged?	15
Tami McCrone and David Sims	
Examining the use of technical qualifications within Key Stage 5 programmes of study	18
Joanna Williamson and Matthew Carroll	
Insiders or outsiders, who do you trust? Engaging employers in school-based career activities	21
Christian Percy and Dr Elnaz Kashefpakdel	
"With a degree I'll get a good job." A role for employers in UCAS decision-making?	24
Dr Susan McGrath	
Vulnerable young people, employers and VET	27
Professor Morag MacDonald, David Kane and Dr James Williams	
Measuring the Wider Impacts of Apprenticeships – the Apprenticeship Wellbeing Survey.....	30
Gillian Wylie, Dr Lynne Robson and Dr Patrick Watt	

The role of school leadership in increasing engineer employer engagement among teachers

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Summary

This paper explores school leadership strategies which encourage teachers to collaborate with employers in delivering the curriculum and providing real-world learning experiences. Building on earlier studies into engineering habits of mind^{1,2} we identified how school leaders create an educational culture and learning opportunities that cultivate children's interest in engineering. Using a positive deviance approach to the research, we found that when school leaders modelled personal attributes and enacted strategies which are encompassed by the phrase *pedagogic leadership*³, teachers are more likely to develop the confidence and understanding to incorporate engineering themes into their subject teaching, in collaboration with engineers.

Context

The projected shortfall in the recruitment of engineers in the UK has encouraged a proliferation of initiatives to attract more young people to engage with STEM subjects⁴, but one of the challenges for schools in England in increasing interest in engineering is that the subject rarely appears on the school curriculum.

Nevertheless, subjects such as design and technology, science, mathematics, and even art and English, can be studied through engineering problems which support children's development of engineering habits of mind (EHoM) or 'thinking like an engineer'. This is most effectively achieved through cross-curricular project-based learning, which can be challenging for teachers to initiate, but if they can see engineering as a way of thinking, not as a specific discipline, this can open up discussion about pedagogy as well as content.

Employer engagement is particularly important in helping young people make informed career decisions about engineering⁵, but achieving sustained employer engagement within the curriculum is complex. Many teachers have limited knowledge of how best to approach employers to involve them in curriculum initiatives.

School leadership, therefore, plays a vital role in enabling teachers to gain the confidence to engage with engineers and work with them in devising learning opportunities within the curriculum.

Method

This was a small-scale mixed methods inquiry. We adopted a positive deviance approach, the premise of which is that solutions to common challenges exist most often in schools that are already performing

outstandingly and that members of the school community will have tacit knowledge and wisdom from which it is possible to learn and generalise⁶.

We grounded the study through an integrative review⁷ of literature on school leadership with a specific focus on leading complex issues such as cross-curricular teaching involving engineering projects delivered in collaboration with employers.

This was followed by an online survey sent to around 210 schools which had a declared interest in engineering through their involvement in engineering education initiatives. The response rate was 28%.

We then undertook individual in-depth telephone interviews with eleven school leaders who had expressed interest in being contacted through the survey. They representing primary and secondary schools and a mix of leadership levels including headteachers and middle leaders. The interviews explored participants' views on the value of engineering in schools, successful experiences of leading education for engineering and their personal leadership skills and attributes.

While this provided rich data about schools currently seeking to value engineering and offer opportunities for their students to explore engineering, the positive deviance approach does have limitations. It is time-consuming and necessarily an imprecise science, seeking to identify successful outliers at all levels of a large school system. Furthermore, those who are succeeding against the odds are, de facto, unusual, so their attributes and strategies may not always be easy to generalise from.

Findings

This study enabled us to understand some of the challenges facing leaders who were creating opportunities for young people to develop an interest in engineering by integrating EHoM into the school curriculum. Challenges included teachers' lack of confidence, perceived restrictions imposed by the increasingly academic focus of the National Curriculum in England and concerns about the negative implications for the school of a poor Ofsted judgement.

Our key finding, whether looking at the role of the headteacher or a middle leader such as head of department, was that the pedagogic leadership style offered the best chance of success in this demanding context. Our subsequent findings were grouped under three main themes: how leaders developed the school culture; the attributes they demonstrated; and the strategies, distributed across four core leadership functions, that were most effective in achieving their goal.

This paper reports on a sub-set of the findings. It specifically examines strategies that school leaders used to help teachers engage with engineers under the four core leadership functions of setting direction, developing staff, aligning changes and managing teaching and learning.

When setting direction and creating the school vision, leaders in schools successfully engaging with engineers established a pedagogy-focused culture in which engineering was valued. Engineering was included in the school's development plan and a whole-school focus on engineering was evident.

Employers were valued partners and engineering habits of mind were used to prompt teachers to think across subject boundaries.

Leaders developed teachers who valued what engineers brought to the classroom by modelling the desired pedagogy and participating in professional development. Teachers operated within an atmosphere of high trust and were encouraged to try innovative methods. There was an environment of supported risk-taking and failure was tolerated as part of the process of gathering evidence on what works.

Leaders were skilled at aligning their vision for engineering to the school ethos. They directed employer involvement to meet school needs. They engaged school governors and parents in their changes.

Finally, leaders ensured that teaching and learning activities were managed to support the vision. Timetabling was flexible enough to allow for project-based learning; assessment and progression statements valued and recognised EHoM learning; teachers had flexibility to deliver the curriculum, but without relaxing accountability.

In the light of these findings, practitioners and policy makers might consider the following to support teachers' engagement with engineers:

At school level, headteachers might consider:

- Recruiting school governors with STEM experience
- Developing professional development for teachers in collaboration with engineers
- Raising the status of STEM teaching through timetabling, space allocation and job descriptions.

At policy level, Ofsted, awarding bodies, engineering professional bodies and school leadership organisations might consider:

- Developing guidance for school leaders on incorporating education for engineering in the curriculum
- Encouraging engineering employers to persevere in their efforts to engage with schools, especially at primary level.

Further information

This paper was based on research commissioned by the Royal Academy of Engineering, published as *Learning to be an Engineer: the role of school leadership*⁸. It is the third report in the series on embedding engineering in the education system through the introduction of EHoM and can be downloaded from: www.raeng.org.uk/ehom-leadership

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