



Royal Academy
of Engineering



UNIVERSITY OF
WINCHESTER
CENTRE FOR REAL-WORLD LEARNING



Head, Heart and Hands:

Powerful examples of practical learning in schools

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About the Centre for Real-World Learning at the University of Winchester (CRL)

CRL is an applied research centre focusing on the cultivation of learning dispositions. Its groundbreaking work in identifying creative habits of mind has been influential in the decision by the Organisation for Economic Co-operation and Development (OECD) to introduce the PISA 2022 Creative Thinking assessment. Since 2014 CRL has been undertaking research into engineering habits of mind (EHoM) on behalf of the Royal Academy of Engineering.

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Introduction

‘The Commission sees the divide between knowledge and skills as a false dichotomy.

Of course children need to acquire the building blocks of knowledge, which will give them the mental framework to analyse and understand the world around them.

But they should also be given the chance to develop the practical, social and emotional tools that will allow them to thrive as they go out into the workplace.’

The Times Education Commission (2022, p.26)

A recent influential report on the education system in the UK¹ stresses the importance of practical learning in schools alongside knowledge.

However, a narrowing of the curriculum and declining opportunities to take practical and creative subjects such as Design and Technology, particularly in England², are reducing opportunities for young people to experience practical learning that combines knowledge, skills, and dispositions important for developing engineers of the future.

Between 2019 and 2022 the Royal Academy of Engineering commissioned the Centre for Real-World Learning at the University of Winchester to find out more about the potential benefits of practical learning in secondary schools and to locate schools that provide examples of promising practice.

In our 2021 review *Reimagining practical learning in secondary schools*³ we found that practical learning, when done well, can be as effective as traditional teaching methods for learning subject-specific knowledge. We also concluded that when research only focuses on whether practical learning is **better** than traditional educational methods, other important aspects of its impact on learning may be missed.

In our exploration of practical learning, we shifted the focus of inquiry onto evidence of additional benefits that practical learning might provide learners. We found that high-quality project-based learning, problem-based learning and inquiry-based learning, for example, can develop a range of beneficial capabilities in learners such as better problem-solving, enhanced creativity, more effective communication and improved collaboration skills. All of these are essential for engineering, and of course, for young people’s self-development, employability and wellbeing.

We also found that practical learning is complex, valuable and an integral part of almost all learning. Without paying explicit attention to creating opportunities for practical learning, it is likely to be overlooked, ignored or undervalued in secondary schools, which are largely measured by success in exams such as GCSE and A levels. Therefore, in this next stage of our research, we highlight schools where practical is balanced with knowledge in the curriculum and where both practical and knowledge-rich approaches to learning are valued for what they bring to young people’s whole education.

1. The Times Education Commission (2022) *Bringing out the best: How to transform and unleash the potential of every child* (Final report). The Times.
2. Tuckett, S. (2022) *A spotlight on Design and Technology study in England: trends in subject take up and the teacher workforce*. London: Education Policy Institute.
3. Lucas, B and Hanson, J. (2021) *Reimagining practical learning in secondary schools: A review of the evidence*. London: Royal Academy of Engineering.

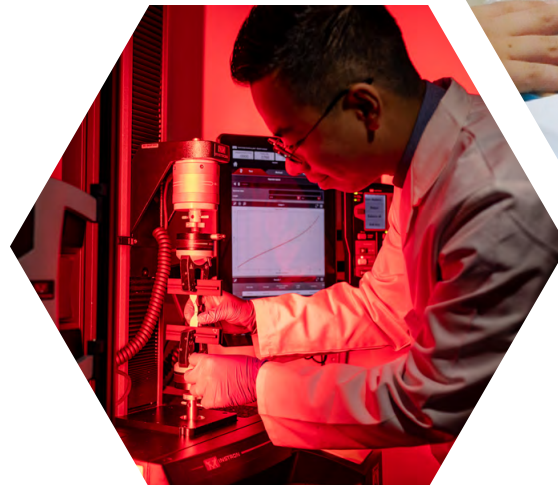
Developing a deeper understanding of practical learning

There are a proven range of benefits associated with practical learning. However, some terms associated with it, such as 'project-based learning' or 'problem-based learning', have generated unhelpful responses with some school leaders and teachers in the past. This is due in part, to some negative media representations that have not properly examined the advantages that project-based learning brings.

We therefore concluded our 2021 research with a definition of practical learning that attempted to explain its broad-based and encompassing dimensions and to move understanding beyond specific 'models'.

We also summarised six characteristics of high quality teaching for practical learning, drawn from the research.

The definition and the six characteristics have informed the second stage of our research highlighting promising practice in practical learning in secondary schools in England.



Definition of practical learning

Practical learning is:

Learning that is whole, involving head, heart and hands working in harmony, when teachers use carefully chosen strategies that encourage learners to:



- experience and navigate real-world challenges
- acquire and apply their knowledge in a range of settings
- explicitly develop skills and dispositions for lifelong learning.

Characteristics of high-quality teaching for practical learning

Making learning whole

Practical learning is about making learning whole, it encompasses learning for the head, heart and hand.

It is a core element of the school ethos and mission that is supported by the senior leadership team.



Embedded in the curriculum

Practical learning is embedded in the curriculum, it is not a 'added extra' or 'bolt-on'. It may be found in interdisciplinary study or within individual subjects.

When practical learning occurs in enrichment activities, links with the curriculum are made wherever possible. At their strongest, these support curriculum outcomes.



Learning for the real-world

Learners apply their knowledge in tasks that are contextualised to show how useful the knowledge can be in real-life situations.

The knowledge presented is related to issues learners care about and shows them how it can be applied in different jobs and careers.



Using a full range of teaching methods

Teachers use carefully chosen strategies to foster practical learning, including modelling behaviours such as embracing mistakes as learning opportunities.

Teachers balance instruction with inquiry, structure tasks, provide scaffolding, relate new knowledge to existing knowledge, trust learners to learn and welcome co-creating with pupils. Teachers are continually learning themselves by accessing professional development opportunities.



Cultivating learner agency

Practical learning cultivates learner agency when it encourages a sense of belonging, both to the school and community, enhances the student voice, a desire to participate and the capacity to solve problems.

Exercising agency involves making appropriate choices, taking responsibility, self-reflection and willingness to improve.



Tracking learner progression

Teachers and schools show that practical learning is valued when there is a system for tracking learners' skills and capabilities. Where learners are encouraged to demonstrate the full range of what they know and what they can do.



Identifying case studies of promising practice in schools

In order to gain a deeper understanding of the current environment for practical learning in English secondary education, and to identify potential case study schools, we invited education leaders from organisations whose research we had drawn on in our 2021 review to assist us.

The organisations approached included charitable foundations, community interest companies and professional associations. Nine individuals agreed to be interviewed.

We asked them to identify schools that might be approached to contribute a case study. The schools needed to meet the minimum quality threshold of 'Good' in their most recent Ofsted inspection, or ISI equivalent.

We then invited schools to participate in our research. After securing their agreement in accordance with our ethical protocol agreed by the University of Winchester, we used online interviews with teachers and pupils to find out more about how they engage in practical learning. We invited them to share what they believe to be the benefits for learning of their practical pedagogies.

The case studies were compiled using these interviews and other material from the schools' websites. The contents of each case was agreed by the school before publication.



Director, Forth Together CIC,
and Professor of Design,
Kingston University

Learning and Skills Director,
Crafts Council

Physics teacher, Chipping
Campden School. Teaching &
Learning Lead, The Ogden Trust

Head of Policy – Education and Skills, The Royal Society

Co-director of Big Education,
and Co-founder of Rethinking
Assessment

Executive Director,
Edge Foundation

Chair, Board of Trustees,
Comino Foundation

National Council Member, Arts
Council England

Chief Executive Officer,
The Design and Technology
Association

Powerful reasons why schools should engage in practical learning

The purpose of education should be about much more than just imparting knowledge; education should build knowledge *and* capabilities in young people.

'We want to develop the physicists of the future. We want them to have the skills, but we also need to ignite that flame and challenge them through practical work. Getting the balance between that and knowledge is really important, knowledge and practical are moving side by side and intertwined where possible.'

Jackie Flaherty

'Practical application of knowledge is a very useful skill set to have, moving forward in life. The idea of students working within a context, finding a problem within that context, iterating their way through it, and using whatever skills they need to solve the problem, is exactly what the world needs.'

Tony Ryan

'I've always been intrigued by how to unlock confidence in people, either in the workplace or in schools and there's something about well-constructed practical learning, particularly in the arts and outdoor education, that develops confidence. Right throughout the education system I think we vastly undervalue the development of confidence in young people.'

Paul Roberts

The purpose of education should be about much more than just imparting knowledge



A school that is rich in practical learning...

...reaches out to its community and serves its interests, contributing to regeneration.

Schools that value practical learning are open to new ideas and are fully involved with the community. The school communicates with its local industry and in turn, employers are willing to contribute to the curriculum.

'They link business and industry to the education; that's a real trait that we see in the best schools. They reach out and find context outside of the school, and experts who feed into the curriculum offer and enrich it and make students' experience broader and more relevant.'

Tony Ryan

Opportunities to create links between the school and its community were even taken during the COVID-19 pandemic at a time when the world was mostly looking inwards or closing down.

'There is a move that's been accelerated by COVID to root the school more directly with families in the community and doing projects that solve problems in the community, which is very attractive.'

Peter Hyman

One striking example of the power of community engagement that boosted the relevance of practical learning was the very visible contribution of D&T teachers in supporting the NHS, as they used their tools and materials to manufacture PPE equipment for hospitals in the early days of the COVID-19 pandemic.

'If D&T teachers needed to see the relevance of their subjects, the pandemic has given them that; we produced nearly 2 million items of PPE in the course of three months, we had health service leads reaching out to us saying 'Can you put us in touch with schools because I hear you're making visors' and we were getting visors out there. For an awful lot of teachers, it's given them real value.'

Tony Ryan

Learning at home during COVID-19 lockdowns expanded pupils' and parents' knowledge of careers, since technology could be used to bring in experts from anywhere in the world.

'For some of the more rural or coastal schools that we work with, they've been able to open their kids' eyes to a much bigger range of practical careers, because it doesn't actually matter whether the person on the screen is calling from San Diego or from up the road.'

Olly Newton

A school engaging in practical learning with industry or external experts can demonstrate how it might contribute to the government's levelling up agenda and be part of the bigger dialogue about society.

'Anything we can do to show a connection that is part of a bigger policy objective, levelling up, recovery and innovation. I think we have to be part of the solution, don't we?'

Nicky Dewar



...supports and develops its teachers

Practical learning pedagogies are complex and challenging to implement. As a result, schools that do it well support teachers to critically engage with the pedagogies, to develop their professional practice, and have confidence to contextualise practical learning to the needs of their learners.

'It is a pedagogy that is sophisticated and challenging. It involves a recognition that you have to adapt it to the particular context, to class differences and to individual kids' differences. It's never best practice picked up from over there and plonked down over here, it's so much more than that, it's always that interpretation of practice.'

David Perry

'I think there's something about the teachers themselves feeling supported and impassioned, and having the confidence to think about 'what does this look like in my classroom for my pupils', so their priorities are able to flex those subjects to suit those needs.'

Nicky Dewar

Teachers demonstrating ingenuity and creativity during the COVID-19 pandemic has led to an increased valuing of practical learning.

'With practical learning in the pandemic, we saw people actually having to improvise a lot more, having to use whatever was around and having to be more innovative.'

Daniel Charny

Schools find ways of breaking down barriers between departments. They encourage teachers to share ideas and collaborate on cross-disciplinary teaching.

'There are lots of ways, built into how the school works, that encourage teachers to collaborate across departmental silos, such as the design of the building and who is located next to whom.'

Peter Hyman

...is led by individuals who value practical learning

Practical learning depends on the endorsement and active engagement of senior leadership. They will position practical learning as a valued element of the curriculum that aligns with a strong vision for how practical learning fits its ambitions for its learners.

'You need a leadership who understands this, if the head teacher doesn't relate to all this then it's a bit of a lost cause.'

Paul Roberts

'There's an attitude about student agency which is important; there is an attitude about the school being porous to people and ideas.'

Peter Hyman



Opportunities for practical learning going forward

Our contributors offered their views on some of the current arguments nudging schools towards recognising practical and academic learning as having equal value.

A more expansive view of the purpose of education is needed

'In my view, we're failing a whole generation of kids by forcing them through an education system that is not fit for purpose... At the moment we're only using the head and we're cramming it so full of stuff that kids are confused as to why. We need to step back and think why a school is there, what's the purpose of it, what does it exist for, let's really look at the kids that we need, for the future of society, and the future of this country.'

Tony Ryan

'I think there is a growing awareness of the need for a holistic education and practical learning. There has been an expanded vision about what is possible, so the value of practical learning is more recognised.'

Peter Hyman

Practical learning is valuable for engaging all young people in learning, not just the disengaged or disadvantaged

'In a lot of schools that I work with and elsewhere, I see the equating of practical skills with those who are harder to help and with alternative provision within schools. One of the things we're trying to do is democratise that a bit more and get staff to actually offer those kinds of things to the broader group, but it's a hard starting point because it means that teachers ask 'Why am I doing that? That's for the kids who are going to be kicked out.'

Olly Newton

The application of knowledge to current issues of concern can make the curriculum more meaningful to young people

'There should be a new curriculum to respond to this era; one that deals with issues like climate change and inequality, that integrates them, not separates them, so it's part of the learning. In practical learning the relationship with purpose is very valuable, we found that a lot of children respond to that very well.'

Daniel Charny

Practical learning benefits learners' wellbeing and mental health

'By practically engaging with craft activities, whether you're making an exquisite object of museum quality, or whether you're doing it in a community setting with others as part of a conversation that supports your health and well-being, there is growing evidence about how making together has the ability to connect people and challenge issues around isolation and loneliness.'

Nicky Dewar



Challenges for practical learning going forward

The accountability framework

Innovative practical learning often happens in schools in spite of the education framework for accountability, rather than being encouraged by it. Nevertheless, there was a consensus among our respondents that the revised Ofsted education inspection framework for schools recognises the importance of balance between imparting knowledge and applying it through practical learning.

However, other aspects of the accountability regime may pull school leaders back towards the safer shores of more traditional methods where there is less risk of time potentially wasted, of innovation failing, or of promise not being fulfilled.

'At the end of the day, it's the performance tables, the EBacc and Progress 8 that are at the forefront of their minds, and I think it's those that are the drag anchor that is preventing them from taking advantage of those other policy steers.'

Olly Newton

'There is less of a risk with knowledge-based learning, and my fear is that the system has become more risk averse and consequently less trusting that knowledge acquisition and greater understanding can be achieved through exploration and inquiry – including practical learning. In a lesson where the focus is simply on learning facts, the risk of failure is perceived as lower, even if the lesson execution is poor. School leaders and teachers make an unconscious cost-benefit calculation on how to deploy their limited resource, based around an assessment system that overwhelmingly values a narrow concept of success.'

Peter Finegold

The language of practical learning

The terms used to describe practical learning are varied and often hinder a full understanding of its value. Terms associated with so-called 'progressive' education, such as inquiry-based learning or project-based learning, have a poor reputation in the UK, compared with international education systems, so it is important to clarify terms.

'We've been trying to strengthen understanding of what we mean by project-based learning...and have clarity on reclaiming the terms and having a bit more structure to them, so that we know that when things get that label, they are achieving the aims that we want them to.'

Olly Newton

Or use terms that carry more weight, such as interdisciplinary learning or design thinking.

'Interdisciplinary learning is the most credible because it feels academically rigorous and when you talk about STEM, or STEAM, it is unimpeachable since it feels like these are serious subjects coming together. Then you're having a discussion about how you combine them, which is useful for those you want to win over.'

Peter Hyman

'We need to link to how the design process is being used in business and industry as a tool around which to structure the business. If school leaders had a better understanding of that and how it might be applied to their school, then they might actually value that interdisciplinary approach more.'

Tony Ryan

Shortage of specialist teachers

A significant challenge to increasing practical learning in schools is the shortage of specialist qualified teachers.

'In secondary, the biggest problem we've got in physics is a lack of qualified physics specialists. Those numbers are really worrying.'

Jackie Flaherty

'There are real challenges from COVID for science, and we know that teacher training and NQT support have been disrupted. There are real concerns about newly qualified teachers not having had experience of running practical work.'

Peter Finegold

Furthermore, teachers' lack of confidence to use practical learning approaches, extends beyond science to many creative subjects.

'We have so many more non-specialists in our schools now trying to teach across those creative subjects. It needs skills, knowledge and confidence to bring those practices into the classroom. So how do we upskill our educators?'

Nicky Dewar



Securing powerful advocates for practical learning is important

Powerful advocates for practical learning do exist and it is important to engage them. Making compelling arguments can increase the likelihood of mobilising their support.

'We need to get our story straight, in the sense of 'Is practical learning valuable in its own right? Is it valuable to get higher academic results? Is it both? There are some tensions in the narrative, we're trying to persuade people, and I think that the stronger we can make that shared narrative, then the more helpful it is.'

Olly Newton

Two powerful groups of advocates for practical learning are industry and independent schools.

Industry voices can make the case for education to develop not just specific skills but also the broader dispositions in young people such as creativity and problem-solving.

'We underplay the role of employers, who should have a louder voice in saying "we need the dispositions, we need the skills, we need the more holistic way of thinking about things, we need ingenuity", and all those other things.'

Peter Hyman

Independent schools have embraced practical learning, in part because parents see its value for their children.

'The great thing about good design and technology in private schools is that their support comes imbued with status. So if a [well-known public school] says art or design and technology is important, people will listen, whereas if that wonderful bog-standard comp down the road does, it's not listened to, it just doesn't have the power. We do need to leverage that status of independent schools.'

David Perry

Finally, many teachers, fortunately, remain passionate about bringing practical learning into their classrooms, as we shall see in the case studies that follow.

'I think a great many teachers in their heart of hearts, like the parents, see the value of a proper rounded, broad and balanced education. They see the kids who they can reach through practical ways of learning.'

David Perry

Many teachers remain passionate about bringing practical learning into their classrooms



The case studies

These case studies show how schools can avoid the false dichotomy between knowledge and skills, and bridge the divide between 'practical' and 'academic' subjects when delivering the curriculum.

The cases demonstrate how the schools have embraced practical learning because it fits with their ethos and vision for education.

The selected schools serve a diverse range of communities across different regions of England. They range in size from just under 200 pupils to just over 1,000 pupils and include a community school, schools in multi-academy trusts, two independent schools and one special school.

Teaching for high-quality practical learning in these schools was sometimes informed by reference to well-known international models of practical learning such as Expeditionary Learning or International Baccalaureate programmes but not exclusively. In all cases, our six core characteristics for high quality practical teaching were evident, alongside the benchmark quality rating of a Good or Outstanding Ofsted judgement or its ISI equivalent (at the time of publication). Most importantly, each school has developed its own approach that matches its vision for its learners and its community.

While high profile schools such as School 21 and XP, or schools designated University Technical Colleges (UTC), are to be praised for the examples of practical learning they offer, in this report we have purposefully aimed to expand perspectives on promising practice through these case studies.

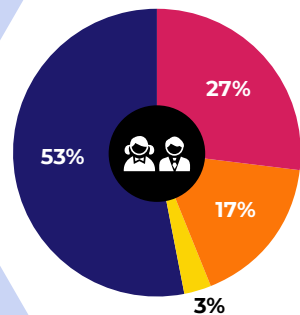
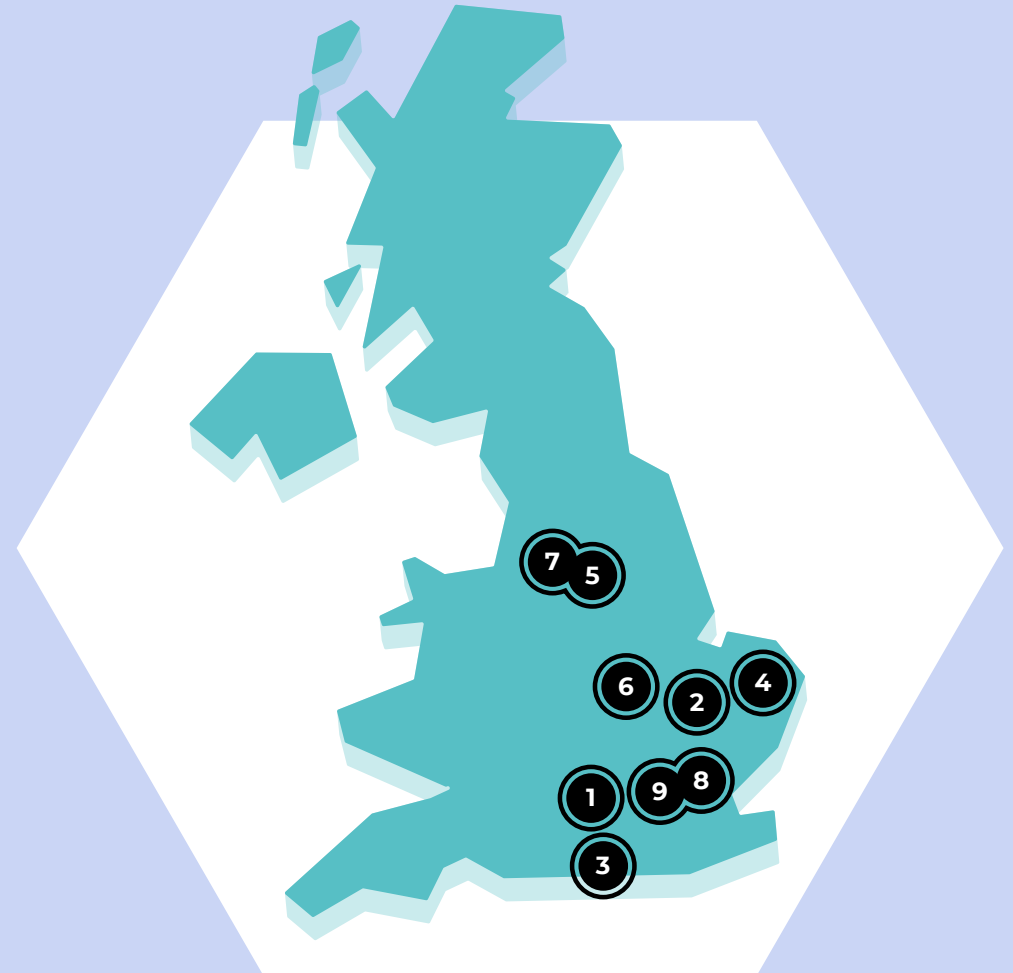
Schools can bridge the divide between 'practical' and 'academic' subjects



The schools

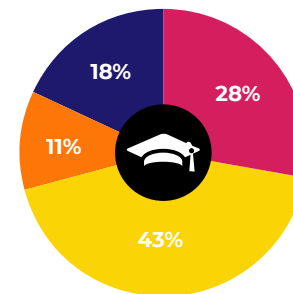
The schools featured in the following case studies are:

- 1 Bohunt School Wokingham, Arborfield, Reading
- 2 Ely College, Ely
- 3 Gosport and Fareham Multi-Academy Trust, Gosport
- 4 Hethersett Academy, Hethersett, Norwich
- 5 King Egbert School, Sheffield
- 6 Oakham School, Rutland
- 7 The Derby High School, Bury
- 8 The King Alfred School, London
- 9 Woodfield School, London



71 Pupils interviewed

- Year 7 (19 – 9 oral, 10 written)
- Year 8 (12)
- Year 9 (2)
- Year 10 & 11 (38 – 20 oral, 18 written)



28 Teachers interviewed

- SLT members
- Head of STEM subjects
- Head of Art, Drama or English
- Teachers and Technicians