ETON JOURNAL FOR INNOVATION AND RESEARCH IN EDUCATION

ETON COLLEGE

EDITORIAL

Kayleigh Betterton | *Editor*

As teachers, we are continually changing our teaching practice to adapt to the needs of the students, the content we are delivering, and the context in which we are teaching. Engaging consciously and consistently in the process of reflective practice takes time and focused attention. It is a cyclical, iterative process: one must first teach, then self-assess the effect that teaching has had on learning, before considering new ways of teaching, and trying out these new ideas in practice. The process can then be repeated endlessly. Linda Finlay defines reflective practice in her 2008 paper as 'learning through and from experience towards gaining new insights of self and practice'; and if it is conducted systematically, then teachers can make links from one experience to the next to ensure that their students make maximum progress.

This issue of the journal seeks to explore some of the changes that teachers have made to their practice and considers the factors that influenced those changes. One of the aims of the reflective process is to encourage teachers to work with others as a way of sharing best practice and drawing upon other practitioners for support. We hope that this issue of the journal will function in a similar way.

Contributors to this issue consist of teachers from Eton and other schools, support staff, and students from Eton's Education Society. Articles cover a wide range of subjects. The contributors draw on the breadth of their professional experience, but they can be broadly grouped into the following key themes: we open with reflections on teaching in different school contexts; these are followed by articles which assess the use of different teaching approaches; and finally, our contributors consider the use of reflective practice outside of the classroom.

THIS ISSUE OF THE JOURNAL SEEKS TO EXPLORE SOME OF THE CHANGES THAT TEACHERS HAVE MADE TO THEIR PRACTICE AND CONSIDERS THE FACTORS THAT INFLUENCED THOSE CHANGES.

In terms of reflecting on teaching in different school contexts, Joe Dangerfield discusses his experiences of teaching in the US, whilst Daniel Soars focuses on what is distinctive about the teaching ethos in Jesuit, Benedictine and state sixth form schools. Three articles in this section are from external contributors: the first is by Claire Badger, Senior Teacher, Teaching and Learning at the Godolphin and Latymer School, who writes about introducing whole school professional development. The second is by Mark Beverley, the Director of the Institute of Teaching and Learning at Sevenoaks School, who writes about how to establish a reflective culture in schools for both teachers and students alike. The third article is by Glenn Whitman and Ian Kelleher from the Center for Transformative Teaching and Learning at St. Andrew's school in Maryland, US. Their article looks at the impact of teaching a 'Mind, Brain and Education' programme across the entire school. Finally, the keepers of Eton's Education Society have contributed an article in which they reflect on the student experience of different teaching approaches.

The second section of the journal looks at the use of different teaching approaches. David Hallwood, Clare McKinnel, Sam Shields and Daniel Townley have looked at various strategies in terms of teaching in the sciences. Phil Macleod suggests ways of creating intentionally a 'Learning Landscape' that is both a physical space where learning takes place and the values that inform it. Richard Doorbar considers ways of creating spaces for reflection during the course of a lesson. Finally, Oli Cooper explores lessons from behaviour management approaches in coaching, and how these can be applied in a classroom setting.

The final section of this volume includes articles which explore the use of reflective practice outside the classroom setting. Nico Flanagan and Tim Beard reflect on sports coaching and the sporting educational environment at Eton. David Gibbons argues for greater rigour in appraising the value of education research, citing the Critical Assessment Skills Programme used by the medical profession. Finally, Jonny Nelmes considers the role of peer-to-peer observations and the observation feedback conversation that follows the observation as a powerful reflective process.

These articles – a combination of research, reflective accounts, and opinion pieces, drawing upon numerous areas and disciplines – all invite us to pause and to reflect on our practice and our understanding of education.

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FLIPPED LEARNING: FROM THE AMERICAN SOUTH COAST TO ETON COLLEGE

Joe Dangerfield | *Teacher of Physics, Eton College*

After teaching at Eton for seven years, I left to do an exchange year in the US at a school on the South Coast. This school, based in Los Angeles, was unique at the time as they used a predominantly flipped method of learning for all year groups and in every subject. Flipped learning is a technique whereby students study the curriculum materials mainly outside of class, so that in class the teacher can focus on deepening their understanding rather than on the basics of covering the content.

Although they were a co-educational day school, the school was remarkably similar to Eton in terms of academic culture. Their students possessed similar levels of motivation and ambition and the school perceived itself as a place of academic excellence on the West Coast. Once I returned to Eton, I realised the extent to which US schools were ahead of those in the UK in terms of innovative teaching and learning, and this is why I decided to trial something new and introduce a flipped learning approach at Eton.

School Context

It is my understanding that the school was inspired by those on the East Coast who were practising this approach regularly. When I first started there, the flipped learning method was frustrating as it felt as though it was limiting my autonomy. However, after a while, the benefits to the students became clear. Not only were they more independent as learners but it was clear that by being exposed to a variety of different learning experiences, they had a higher degree of independent motivation and responsibility.

Masters at Eton are highly qualified and passionate about their subject; however, this is not always enough to engage boys, and at times we perhaps operate under the illusion that more learning is taking place than actually is. It is for this reason that I thought that a flipped learning approach may provide considerable benefits to our boys, as it places the onus back on them. They would have to devote time to covering the content themselves and then the live lessons would be dedicated to practical work and for students' questions.

The flipped learning course

After a year of planning and consultation with our Executive Leadership Team, I developed a top-to-bottom blended learning course for C block (Yr 12), delivered exclusively in a flipped fashion. Using the syllabus, each lesson was chunked into individual lesson topics and these were then uploaded onto Firefly, the school's online administration and learning environment. Each one began with the lesson objectives and a textbook reference, followed by a 5-10 minute video of myself where I delivered an introduction to the content as I would have done in a live lesson. Students then had to answer question sets and were provided with a mark-scheme, before answering a quiz. The data from these quizzes could then be collected in order to track progress and check student understanding.

Every member of the department was asked to teach C block in this manner and although some colleagues were sceptical, the majority were enthusiastic about engaging with the approach.

The response

On the whole boys responded with quiet indifference, although there was some reluctance initially. The flipped sessions largely replaced EW (homework) tasks and so there was not necessarily an increase to students' workload. Some fully invested and the greatest benefits seemed to be gained by the weaker students, whilst some of the higher ability students believed they were being 'sold short'. All boys were surveyed at the end of the Michaelmas term in the first year and here are some of their responses.

In response to the question: 'Are there any ways in which you feel your learning has been supported well by the course? Please give brief details', boys answered:

'Notes are more concise and organised as they are not made sporadically throughout a lesson. The time we take to make notes is up to us.'

'Yes, because we are learning from the video on our own, if we don't understand something we can take as much time as we like pondering it and researching it for other explanations and if we still don't, we can just ask in divs (class). I feel this is better as we can go at our own pace.'

'I feel I have learnt how to learn by myself and I am becoming more able to understand things by myself.'

The question: 'Are there any ways in which you feel your learning has been supported poorly by the course? Please give brief details', gave rise to the following responses:

'On some occasions I feel like I understand particular examples of a topic, but not the whole topic itself. Although it is then possible to practise in my own time, I sometimes trick myself into thinking that I know the topic when I actually don't know it that well.'

'There is a lot of freedom, so, there are some occasions where I do just the EW and not learn much.'

'I feel that I better understand concepts when I have talked about them face to face with a teacher, and been able to ask questions, which is impossible when learning from a video.'

As you can see from the responses to the first question, boys tended to comment on the independent aspect of the learning process; for example, in terms of developing their note taking skills or being able to set their own pace. However, for the second question we can see that the independent nature of flipped learning can sometimes cause issues with self-discipline and boys sometimes felt as though they wanted their questions answered more immediately, rather than waiting until their next lesson.

In terms of colleague responses, some were fully engaged and enthusiastic about the approach whilst others, like myself, did not like their autonomy being taken away. Nevertheless, during the first Covid-19 lockdown, the flipped learning course was invaluable. When departments were required to create a bank of online resources for students to use at home in a very short space of time, Eton's physics department already had a ready-made course which could be launched straight away.

If I were to redo the course again, one of the key improvements would be to ensure that activities are more diverse. Furthermore, the assessments would adapt based on the students' prior capabilities to provide a more differentiated approach, and would provide students with immediate feedback.

IN TERMS OF COLLEAGUE RESPONSES, SOME WERE FULLY ENGAGED AND ENTHUSIASTIC ABOUT THE APPROACH WHILST OTHERS, LIKE MYSELF, DID NOT LIKE THEIR AUTONOMY BEING TAKEN AWAY.

FLIPPED LEARNING IS A TECHNIQUE WHEREBY STUDENTS STUDY THE CURRICULUM MATERIALS MAINLY OUTSIDE OF CLASS, SO THAT IN CLASS THE TEACHER CAN FOCUS ON DEEPENING THEIR UNDERSTANDING RATHER THAN ON THE BASICS OF COVERING THE CONTENT.

TEACHING PRACTICE

Daniel Soars, | *Teacher of Divinity, Eton College*

When it comes to developing my teaching practice, I find it can be useful to go back to first principles and reflect on why I am doing any of this anyway. Clearly, there is plenty of evidence to suggest that various pedagogical techniques 'work' – whether it is differentiation or interleaving, regular testing or spaced revision – so the answer to the question of why a teacher might want to incorporate these aspects of the craft into his or her repertoire is, at one level, fairly straightforward: doing so will help pupils to learn more effectively (that is, in the sense that these practices will help pupils to understand new material well enough to explain and evaluate it, and commit it to long-term memory). If I were then to ask why we want to teach in ways which will maximise learning, the question would probably sound silly or pedantic – but give it a moment's thought.

Is it because we think learning is an intrinsic good and worthwhile in itself? Or is it because learning is an instrumental good, which will lead to better exam results? If the former, why do we think it is good? If the latter, why are better exam results important? Is it to do with widening pupils' job prospects; or, is it about turning out citizens who will be able to take an active role in society? Or is it just about being happy?

Maybe it is because I teach religion and philosophy, and thus spend quite a bit of my time thinking about what might be called 'ultimate' questions, that I have found that reflecting on these sorts of macro-considerations can be a fruitful way to stimulate responses to the micro-questions of classroom practice. It requires a sort of reverse engineering, where you start with the answer to the big 'why' question (the 'why' of education) and then work backwards from that answer to the more precise details of what sort of teaching techniques will help you to get there. There are at least two advantages to this method: first, the big 'why' question is likely to lead to a number of capacious, underdetermined answers that will allow for creativity and diverse thinking further down the line. For example, if the overriding aim of education is to contribute to human flourishing, there is likely to be a wide range of specific classroom practices that might help towards this end. Secondly, the 'big answer' is likely to be timelessly inspiring. While particular pedagogical techniques might come and go according to the latest research and directives, the reason that motivates us to teach will rise above changing academic and political trends. In other words, I am more likely to embed certain techniques into my classroom practice if I really believe in them.

Fortunately, we don't all have to engage individually and ab initio in the sort of deep and sustained thinking that would be required to answer this big 'why' question (though doing so every now and again is probably worthwhile). Nor do we have to read and assess the various answers offered by philosophers and educationalists who have carried on this conversation across the ages. We are likely to find a version of an answer to it much closer to home – encapsulated in the ethos, mission statement, or 'USP' of our own school. While we often pay lip-service to these guiding principles, my suggestion is that we use them to stimulate reflection on classroom practice. I will give an example of what I mean.

My first two schools were both Roman Catholic: the first, Jesuit, and the second, Benedictine. Between them, these two traditions have approximately two thousand years of teaching experience behind them, but in both cases their vision of education is grounded in a broader understanding of what it means to be human and what counts as a life well lived.

Like most ancient philosophical and religious traditions, Benedictine and Ignatian schools set their sights on the transformation of the human mind and heart. They have been emphasising the formation of the whole person long before it became a ubiquitous tagline on school websites, and have always seen intellectual and moral virtues as two sides of the same coin ('character education' avant la lettre). They have also spent centuries considering how to move from an understanding of their core guiding principles to the practical level of making these principles real in the classroom. Unsurprisingly, therefore, there is a great wealth of 'CPD' to be found in the collective wisdom of these traditions.

I have found that reflecting on the answers they provide to the big 'why' question of education has been immensely helpful in stimulating my thinking about the fine-grained 'why' questions of classroom practice. Thinking about how to translate the core Benedictine principles of conversion, discipline, and humility into my lessons led me to discover the Harkness method of conducting discussions that are collaborative and pupil-led; whilst the Ignatian pedagogical paradigm of 'experience, reflection, action' made me think about how to create lesson starters which would tap into the individual insights that each pupil brings to the subject matter at hand and the need to know each pupil well enough in order to do this (what Jesuits call cura personalis).

There are many more examples I could give, but the point of this article is more to recommend a process which might be fruitful throughout a teaching career than to suggest specific techniques which you might try once and then forget. Maintaining a lively interplay between the big question of 'why' I am teaching at all and the more technical questions of how I should teach this lesson has been, in my experience, a constantly surprising way of regenerating my classroom practice.

TEACHING APPROACHES: THE BOYS' PERSPECTIVE

Will Hope, Cees Armstrong, Eren Bozacigurbuz and Taran Glazebrook | *Yr 13 students and Education Society Keepers, Eton College*

Eton's Education Society was created with the intention of informing the boys and teachers of the school about a variety of topics of interest in education, ranging from racism to access to worldwide education. In this article, we reflect on the various teaching techniques used by teachers at Eton and consider how students respond to them. These observations are based on our own personal experiences of teaching methods in departments schoolwide, from discussion-based teaching favoured in the Humanities and Social Science departments to instruction-based teaching used in Mathematics, Physics, and Biology, among others. Ultimately, our examination of these two teaching approaches demonstrates that each technique works better for specific subjects.

The first teaching style that we will consider is perhaps the most common within Eton: the highly engaging discussion-based approach. Used mostly in Humanities and Social Science subjects, this teaching style uses an instructional approach that prioritises learner acquisition of knowledge, skills, and attitudes through discourse, rather than a more passive approach. In our A-level experience at Eton thus far, we have found this approach to be highly effective in learning key information about current affairs in Economics and Politics, for example the global implications of the conflict in Ukraine. Naturally, there are many differing opinions within classes; by discussing our beliefs, we are able to see each other's different perspectives, broaden our horizons and develop our depth of knowledge in subjects. A few of my peers have noticed that the teachers who use this method best often tailor future questions or work to students based on their responses in class, allowing for weaknesses to be addressed quickly. We, and many of our peers, agree that discussion-based teaching is ideal and highly enjoyable for Humanities and Social Science subjects in particular.

Instructional teaching begins within learning topics and then being made to answer questions on them. Primarily, it is the dominant learning method in the Sciences, Mathematics and many Languages. In it, a particular skill is taught, and then that skill is practised through translating passages or doing problem sets on the topic. In my A-level experience, this approach can often be more challenging as it forces you to complete a lot of the work yourself; however, it is by far the most successful way of learning how to execute the skill yourself. For example, while learning the formulas in Mathematics is helpful, the most important skill is in selecting which formula to use and adapting it to the specific question, which is only possible through extensive practice. This makes it more effective than just discussing the notes in class, as it is very easy to trick yourself into thinking that you really understand a topic when the teacher explains it, but much harder to do so when you are stuck on the problem itself. This type of learning is complemented well by teachers going through the more challenging problems afterwards, so that you can see where you came up short and how to improve your answers the following time. Thus, across the board this style of instruction and practice-based learning has become recognised for its success in making students improve in their studies.

Given that each subject varies in the way it can arguably be best taught – e.g. Mathematics is better learnt via instruction and practice-based teaching, whilst Politics and Economics are more discussion-based subjects – teaching styles for each subject are often employed to suit the subject. From personal experience, within subjects there tends to be little variation in terms of teaching styles. For example, the majority of History teachers take a discursive approach when teaching a class. This is logical, given that it is important in subjects such as History to discuss and evaluate fellow students' ideas and queries. The similarity in styles within departments is most likely driven by teachers' past experiences on the best way to teach the subject. However, within subjects, there can be variation in the ways in which different topics are taught: some topics are better taught via lecture-based teaching whilst others are best taught in a practice-based way. Due to this, it is important, and beneficial to all involved, that students and teachers discuss how they would like to go about their learning at the start of the academic year. Certainly, in the lower years, without the pressure of exams looming, it may be effective to experiment with teaching styles so that by GCSE and A-level exams students have a clearer idea of what teaching and learning methods are most successful in teaching them each subject, allowing them to maximise their learning potential.

WE, AND MANY OF OUR PEERS, AGREE THAT DISCUSSION-BASED TEACHING IS IDEAL AND HIGHLY ENJOYABLE FOR HUMANITIES AND SOCIAL SCIENCE SUBJECTS IN PARTICULAR.

DESIGNING EFFECTIVE WHOLE SCHOOL PROFESSIONAL DEVELOPMENT

Claire Badger | *Senior Teacher of Teaching and Learning, The Godolphin and Latymer School*

The standard for teachers' professional development published by the Department for Education in 2016 (DfE, 2016) has become accepted orthodoxy within UK schools but recently the evidence underpinning these standards has been called into question (Sims and Fletcher-Wood, 2021). This has led to a re-evaluation of the characteristics of effective professional development which, rather than focusing on specific professional development practices within education, looked instead at general principles about how people learn and change their practice (Sims et al. 2021). This research has led to the publication of a new guidance report from the Education Endowment Foundation on Effective Professional Development (EEF, 2021) which outlines 14 mechanisms, split into four categories, for effective professional development programmes.

In this short piece, I reflect on how we have used the EEF Guidance Report at Godolphin and Latymer to evaluate our approach to whole school professional development. All too often this is only considered from the perspective of what to cover in compulsory whole staff training on INSET days. However, as Tom Sherrington has discussed (Sherrington, 2021), it should instead be considered at three levels: whole school, teams and individuals. To ensure coherence at all three levels, we carefully plan whole-school sessions so that the themes can be picked up within departmental and pastoral teams and we then provide specific time for these departmental discussions with suggested activities which can be adapted for each subject context. Individuals may then choose to work on specific aspects of their own teaching practice linked to these whole school ideas as part of their personal review process or by joining one of our teacher learning communities.

Building Knowledge

The first group of mechanisms is around building knowledge. As with the pupils in our classes, it is important to manage the cognitive load of our teachers and revisit prior learning. All of our professional development opportunities are linked to our whole school priorities - for the last two years these have been around the themes of confidence, community and challenge. By keeping these three themes in mind throughout the year, we manage teachers' cognitive load by ensuring that we only focus on relevant professional development content and try to prevent teachers from feeling that professional development sessions introduce yet another thing that they will need to think about. Repeated reference to our whole school priorities also helps to revisit prior learning throughout the year, although this is also achieved more explicitly by incorporating quizzes and reflective discussion exercises into training sessions. In addition, revisiting prior learning is facilitated by encouraging heads of department to return to themes covered during INSET in departmental meetings.

PROVIDING AFFIRMATION AND POSITIVE REINFORCEMENT AFTER PROGRESS HAS BEEN MADE IS ANOTHER MECHANISM FOR MOTIVATING TEACHERS.

Motivating Teachers

The EEF report suggests motivating teachers by presenting information from a credible source. In many schools, this is often seen as employing an external consultant to deliver training on a September INSET day. Our staff have a broad range of prior experiences and therefore it is extremely difficult for such trainers to pitch their sessions so that all staff are engaged and see the relevance of the information to the school's context or their own teaching practice. Recently, we have avoided using external speakers for whole staff sessions and instead bring in experts to run optional sessions which interested staff can sign up to attend. External expertise is still utilised for whole staff sessions but we have found it to be more effective to use our own staff to present ideas from research. This allows us to show clearly how the research links to work we already do and suggests ways to improve in our own context; the EEF Guidance reports have been invaluable in planning these sessions (see e.g. EEF, 2021; EEF, 2018).

Self-determination theory links motivation to autonomy, relatedness and competence (Niemiec and Ryan, 2009). These are helpful ideas to consider when thinking about the pupils in our classes, but they apply equally well to teacher professional development. Autonomy can be conflated with free choice and individuality and therefore, the concept of teacher 'agency' better captures the idea that teachers and subject teams should be free to decide for themselves which aspects of their practice they wish to develop within certain parameters. Our whole school priorities provide the parameters, but beyond this, we encourage agency by not dictating exactly how these should be implemented on a team or individual level.

Providing affirmation and positive reinforcement after progress has been made is another mechanism for motivating teachers. We celebrate success by providing opportunities for teachers to present a 'learning tip' in our weekly staff briefing sessions and by giving heads of department opportunities to present in head of department meetings.

Developing Teaching Techniques

The third category of mechanisms for effective professional development is around development of teaching techniques. The teacher learning communities (TLCs) that have been set up provide a clear system for this (Badger et al., 2019), although they are also covered on an individual basis through our yearly professional review system and specific support is also given to early career teachers via their mentors. Teachers within TLCs are expected to carry out peer observations in between meetings and this provides opportunities for teachers to model techniques to others, as well as to receive feedback in a low stakes, non-judgemental way. These discussions, along with regular TLC meetings, provide practical social support to teachers in developing their practice.

Embedding Practice

The final category is about embedding practice. Prompts and clues are provided through a weekly email with links to blog posts and recent research publications, as well as through our weekly learning tips. Action planning and self-monitoring are a key part of the TLC model.

The publication of this report provided an excellent opportunity for our school to reflect on our current professional development practices through a new lens. It has provided affirmation that many of our professional development practices are aligned with what the evidence suggests should be effective but has also prompted consideration of where improvements could be made: for example, considering to what extent heads of department are making best use of their role in professional development, particularly around developing teaching techniques and embedding practice in a subject-specific context. As a result, we will be running heads of department training on this topic later this term and will be building on these ideas throughout the next academic year.

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THE PUBLICATION OF THIS REPORT PROVIDED AN EXCELLENT OPPORTUNITY FOR OUR SCHOOL TO REFLECT ON OUR CURRENT PROFESSIONAL DEVELOPMENT PRACTICES THROUGH A NEW LENS.

EVERYDAY EVIDENCE-INFORMED TEACHING:
10 YEARS OF INSIGHTS

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Dr. Ian Kelleher | *Teacher of Science, Dreyfuss Chair for Research, St. Andrew's Episcopal School (USA)*

What would be your answer to the following question: "How do you help good teachers become great, and great teachers become experts?"

We at St. Andrew's Episcopal School (USA, DC area) were pondering this question in 2007, and it yielded a maze of answers. Our attention was grabbed by the emerging, related fields of learning and the brain, and evidence based education. It was grabbed even tighter when we realized that so few people knew anything about these ideas that seemed to lie at the heart of what we strove to do each day. It led us to commit to training 100% of our teachers and school leaders in evidence-informed practices; and, four years later, to establish the internationally recognized Center for Transformative Teaching and Learning (CTTL). It was the first ever Mind, Brain and Education (MBE) research center embedded in a pre-collegiate school in the US.

The imperative for this collective training was driven by one indisputable educational truth: every day, every student in every school will have their brain with them – regardless of school type, regardless of location. Shouldn't every teacher, therefore, have training in the growing body of research on how the brain learns best?

Sadly, such training isn't a requirement in most schools of education and teacher prep programs in the United States (where we teach) or around the world. This might be the greatest irony in education: we work with the organ of learning each day, but most teachers do not have foundational knowledge in how it learns, works, changes, and thrives. Nor do they have training in how to best design schools and learning experiences with the brain in mind. So, in the words of the late, great American author, Toni Morrison, "If there's a book that you want to read, but it hasn't been written yet, then you must write it."

There has been a lot of talk quite recently by John Hattie and others about the transformative potential of collective teacher efficacy, although less on the details of how to go about building it. But when we began our journey 15 years ago, this was just one of many things we didn't know anything about. What we did know right from the start, however, was that it had to be an all-in model for us. 100% of our preschool through 12th grade faculty needed to be using evidence to inform their practice – though this would look different from person to person depending on their context, needs and interests. We imagined that the greatest impact on each child would come from the cumulative impact of perhaps sixteen years' worth of teachers, all of whom have been using the best research that exists to inform how they go about academic, social, emotional, and identity development.

To aid this process, we took a deep dive through the realms of academic literature, and distilled a 'What should every teacher know about the brain and learning?' list. From this, we developed a common language and framework for our teachers to help them use insights from research to inform their everyday practice. This list includes feedback, metacognition, formative assessment, cognitive load, theories of motivation, multiple modality instruction and assessment, memorizing strategies, mindsets for learning, sense of belonging, stress, literacy, and executive functioning skills. It also includes less talked about things like neuroplasticity, myelination, amygdala, cognition, working memory, and neurodiversity. It will always be an evolving list.

Importantly, our common language and framework was designed by teachers, written in the language of teachers, to be used by teachers. That was the goal – to get everyone at the school on the same page by making highly usable tools for busy teachers that would genuinely help their students.

When we later learned Bandura's classic definition of collective efficacy – a group's shared belief in its conjoint capability to organize and execute the courses of action required to produce given levels of attainment – it seemed to fit what we had been endeavoring to do.

It is important to note that the common language and framework is not a cookbook: follow this recipe and, by magic, evidenced based practice will make rainbows appear and unicorns fly through the sky. That is not how it works. Rather, there is a final translational step that only the individual teacher can make.

It involves taking the promising principles from research, mixing them with your own professional wisdom as a teacher and the collective wisdom of the community of teachers you are in, mixing in your subject matter expertise, mixing in your own secret-sauce as a teacher, and putting all these ingredients into the high speed pedagogical blender to figure out what it looks like at 2:00 pm next Tuesday in your History class. Or, at the school level, what do your daily schedule or homework guidelines look like? What, in all aspects of your school, will really make a difference for your students?

This is where the true power of evidence-informed teaching lies: a community of teachers given a freedom to explore what great teaching looks like, a freedom underpinned by a solid but flexible structure that allows discussions to happen across traditional silos.

Imagine two 9th grade teachers of History and Biology, both memory intensive subjects, discussing how to embed memory strategies into their classes. It would look different in the two subjects, but there would be a sense of coherence that would help the students build their study skills. Imagine 4th grade through 12th grade Mathematics teachers talking about how to make spaced practice and interleaving a core part of homework in developmentally appropriate ways so that students grow up thinking of this as an utterly normal part of how you go about learning mathematics. Imagine an Art and Language teacher collaborating on the design of a "transfer your knowledge to a new context" project, so that the Language teacher can tap into design skills, processes, and vocabulary that students already know, so that their project is centered on deep thinking and learning rather than arts-and-crafts.

Our common language and framework became the CTTL's MBE Strategies Placemat (for secondary schools) and the MBE Strategies Roadmap (for Early Childhood and Elementary schools). More tools were developed, such as our neuromyth-busting card deck, our free online Neuro-Educational Confidence Diagnostic, and our set of online micro-courses, Neuroteach Global. Being teachers, we took a teacher approach – where there is a need, develop a teaching tool to meet that need. For us, there is an added criterion: all tools need to be based in the science of teaching and learning, both in content and in how they are presented to teachers. Use the science of teaching and learning to teach the science of teaching and learning. After a few years, we moved on from just working with our own faculty, and now train teachers in all types of schools across the US and all around the world.

Our journey has been made possible by great friends. The research that informs the CTTL's work is drawn from collaborations with faculty from Stanford University's School of Education, the Science of Learning Institute at Johns Hopkins University, the Department of Psychology and Brain Sciences at Washington University in St. Louis, along with the Education Endowment Foundation, Evidence Based Education, and Teacher Development Trust in the UK. The CTTL is an active member of the Global Science of Learning Educators network, and we are friends with, and greatly appreciate the usable knowledge from, the folks at ResearchED and Deans for Impact. We stand on the shoulders of giants.

But the promising principles in the scrolls from the academic literature on teaching and learning need the final step that only a classroom teacher can make. What is a need or opportunity in my class or school? What might this promising principle look like in action? What could I look out for to gauge whether it is having a positive impact or not?

AFTER A FEW YEARS, WE MOVED ON FROM JUST WORKING WITH OUR OWN FACULTY, AND NOW TRAIN TEACHERS IN ALL TYPES OF SCHOOLS ACROSS THE U.S. AND ALL AROUND THE WORLD.

What possible side effects should I look out for? And, based on all this, what should I iterate next time I try something like this out? These final scrolls-to-classroom steps, where the promise from research becomes the lived reality of students, is our area of expertise. It is built on relationships, and it is the gateway for deeper learning.

We have learned quite a bit in our 15-year journey, and we readily exchange our insights with other schools and organizations who seek to help good teachers become great, and great teachers become experts. Here are some things that seem to be useful:

- Most teachers lack an accurate understanding of how the brain learns best, and are eager to know more to best support the learning variability that exists in every classroom.
- A common language and framework creates a coherent pathway for growth in applying the science of teaching and learning throughout a whole school or district.
- Even with a common language and framework, teachers need scaffolded support to (1) find actual needs; (2) find promising principles from research that might help them with each need; (3) translate the promising principles into real world actions; (4) gauge how it is going and iterate. Like all scaffolding, it should be faded away as competence and confidence develop.
- On top of this, next-day examples and non-examples aid teachers' ability to translate themselves.
- Teachers need freedom and support from those they answer to so they can play with this process iteratively over time.
- "One and done" professional learning experiences have low impact on practice. Efforts to build a science of teaching and learning approach should be supported by a multiple modality approach that includes spaced practice with key concepts and skills. Professional development needs to be focused on helping students, sustained, iterative, and grounded in research evidence.

- The concept of neuroplasticity means that the adult brain can change too, and high quality professional development can help do this in positive ways.
- Be purposeful about connecting the dots between teachers' sense of themselves as professionals growing their practice and the impact this has on their students.
- Finding creative ways to tell stories of what teachers are trying, and to honour the work they are doing, helps drive the process. It also contributes to the professionalization of the field of teaching and honours the science and art of teaching. Teachers are often overly humble about the great work they are doing, so having a chief story-finder in your school is useful.
- Every teacher generates evidence of some sort when they try a research-informed strategy out in their class. Collecting these insights from in-school implementation across different schools, countries, and continents to help identify what the crucial ingredients and mechanisms really are is perhaps the next frontier.
- School-university collaborations, in which teachers and researchers work together, are possible and valuable if teachers and researchers are equally committed to impact on everyday teaching and learning.

In 2007, we were part of a school that imagined how much better our future could be if we supported all our students by training 100% of our teachers in Mind, Brain, and Education. It has transformed us. Ian still teaches Science and Glenn still teaches History. Each day is a new challenge. And each day our journey with the science of teaching and learning helps us find ways to help our students dig deep, think hard, and flourish.

We started by posing the question, How do you help good teachers become great and great teachers become experts? We hope that a part of your answer is a deeper dive into the science of how the brain learns best.

Glenn Whitman (gwhitman@saes.org) and Ian Kelleher (ikelleher@saes.org) are the co-authors of *Neuroteach: Brain Science and the Future of Education* and co-designers of Neuroteach Global and Neuroteach Global Student.

WE HAVE LEARNED QUITE A BIT IN OUR 15-YEAR JOURNEY, AND WE READILY EXCHANGE OUR INSIGHTS WITH OTHER SCHOOLS AND ORGANIZATIONS WHO SEEK TO HELP GOOD TEACHERS BECOME GREAT, AND GREAT TEACHERS BECOME EXPERTS.

ON REFLECTION
Mark Beverley | *Teacher of English, Director of the Institute of Teaching and Learning, Sevenoaks School*

In his seminal work, *Visible Learning*, John Hattie writes about the importance and the power of a reflective inclination. 'Evaluating impact', he states, 'is the single most critical lever for instructional excellence—accompanied by understanding this impact and doing something in light of the evidence and understanding' (2012). Regular assessment of the efficacy of the teaching practices we adopt is presented as a hallmark of outstanding teachers.

Just as schools should seek to cultivate reflective teachers, so we should also nurture reflective students – ones well versed in the science and practices of learning and equipped with the tools necessary for self-regulation and independent learning. But to reach a state in which reflective capacity is part of the cultural fabric of a school, time needs to be devoted to it. Teachers must be expected, as well as encouraged, to reflect – and students must be taught how.

Recognition of the power of reflective practice is nothing new. In *Ethics*, Aristotle refers to it in connection with intellectual virtue. But the father of more modern thinking about reflection is John Dewey. In another seminal work, *How We Think*, he describes reflective thought as 'active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends' (1933). More recent models of reflective practice have been proposed by David Kolb in his four-stage learning cycle - moving between concrete experience, reflective observation, abstract conceptualisation and active experimentation. Graham Gibb's *Reflective Cycle* (1988) suggests a six-stage process, and Donald Schon (1987) distinguishes between reflection in action (i.e. whilst an event is happening) and on action (i.e. after it is complete).

Although the models differ in their account of the processes involved, the spirit of each remains the same. As summarised by Boud, Keogh and Walker, reflection is 'an important human activity in which people recapture their experience, think about it, mull it over and evaluate it' (1994) and as a result, make decisions that are more informed, more rational, and ideally more purposeful, in the future.

Perhaps self-evidently, reflective thinking could therefore be considered 'a good thing' – a constructive and creative mechanism through which experience is made more meaningful and fulfilling. And as a cyclical process through which activity is described, analysed and evaluated, it inevitably has particular currency in relation to education – a profession whose very nature depends on the continuous evaluation of effective and ineffective practice. But how do we cultivate its presence in schools where there are so many practical obstacles to overcome?

There is no shortage of CPD available and many start-of-term staff meetings see external speakers delivering inspiring sessions. If it forms part of a school development plan or is undertaken in connection with clear and defined objectives and with careful evaluation of particular interventions over time, this whole school or centrally delivered approach can work extremely well. However, an equally – if not more – effective approach sees professional learning as something over which teachers have agency and control. Studies show that allowing teachers freedom to pursue areas of independent interest, perhaps even making this the default position that schools adopt in their approach to CPD, can result in significant improvement in job satisfaction and retention (Worth and Van den Brande, 2020).

As our own 'Institute of Teaching and Learning' (ITL) at Sevenoaks has developed, we have recognised the challenge of making professional learning a narrative in which all teachers of the community participate, not just those closely associated with it. With explicit support from members of the leadership team, our aim is to make professional learning a more overt part of individual appraisal, to form learning communities of teachers with shared interests, and find times in which individual or group reflection can take place. Staff have been given suggestions about the routes they might take; this includes submitting articles for our own learning journal, *Innovate*, presenting at a lunch time 'ITL takeaway', undertaking a small-scale study or research project, becoming a teaching and learning rep for their department or presenting at a department reflection meeting.

Finally, given the uncontroversial benefits that come from reflection on the part of staff, it would seem logical to extend the same thinking to the students. The impact of engaging in metacognitive thinking, both inside and outside the context of academic study, is well known (EEF 2018), provided it is nurtured in the context of normal lessons. Establishing a programme of study, in which matters relating to learning skills are centrally taught and then carefully modelled in relation to different subjects has become a priority for us, and one we want to develop further over the next 1-2 years. Woven into this programme is teaching understanding of topics such as the teenage brain – a notoriously unreflective organ (Blakemore 2018) – how memory works and growth mindset theory, alongside the more obvious 'study skills'.

We also critically explore the way school values can or should be absorbed as part of the conscious and explicit development of character. Reflection on what it *means* to be collaborative, creative or 'internationally-minded', the challenges of developing self-awareness and empathy,

and how we might both define and acquire a sense of integrity are, for us, a way to reinforce the notion of an holistic approach to learning. It is also a recognition of the manner in which personal, affective experience is very much part of the intellectual or cognitive. Activities designed to foster engagement with these issues happen in tutor time, through assemblies and via our 'core' critical thinking and PSHE programmes, but also – and most importantly – find exposure in the context of normal lessons.

As mentioned earlier, the reflective tendency is not particularly natural, and it is certainly not straightforward or easy. For it to work, the practice has to be addressed, modelled and taught – not as a one off 'study session', but as part of everyday classroom teaching and learning.

The cultivation of a reflective approach to learning, both as teachers and as students, has significant reach, ranging from the development of self-awareness and sensitivity to others to the acquisition of practical learning skills, a capacity for creative and critical thinking, and the realisation of a more ethical, responsible facility. Indeed, as suggested by Carrie Birmingham, reflection can be thought of as a fundamentally moral activity. Relating the concept to Aristotle's notion of *Phronesis* – or 'practical wisdom', she relates its value to the promotion of human welfare: '…the moral complexity of teaching requires phronesis to achieve moral goodness, promote excellence in teaching and learning, and advance human flourishing. Reflection—as phronesis—is both essentially moral and morally essential'.

Both Eton and Sevenoaks have for some time been interested in the concept of human flourishing and the way schools can contribute to its realisation. Reflection as both a practical tool and a philosophical concept would seem to me to have much to add to the discussion, and perhaps even have something to say about one of education's fundamental goals.

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THE LEARNING LANDSCAPE

This is the narrative of an interview given by **Phil Macleod** | *Teacher of Geography and PE, Eton College, to* **Kayleigh Betterton.**

The idea of 'the learning landscape' refers to the literal and metaphorical place where we learn. It is not just about the physical school but the whole environment which surrounds the learning process and the values that inform it. In a boarding school, the learning landscape needs to consist of a seamless web of education from the classroom, to the sports field and boarding house.

How to set the tone and establish expectations

The key to setting the tone and establishing expectations in a learning environment is trust. If the students trust you, then you are in a good place as a teacher; if not, the learning landscape will fail. Trust also enables students to feel as though they can admit when they do not understand something because there is no fear of failure.

This is also interlinked with progress, as students need to feel as though they are making progress or else their trust in the learning process evaporates. One way of achieving this is to encourage students to engage in goal and target setting. This should include at least one target focused on continuing doing something well, and two additional things to try to improve upon. Students should then revisit these at various points during the course and reflect on whether or not the targets have been achieved.

Another way to set the tone is through mutual respect. The students deserve the same respect as the teacher; students should know that, in the classroom, everyone is equal. For this to work, it needs to be communicated to them at the beginning of a course and one of the ways this can be demonstrated in the classroom is through peer-assessment.

When students do peer assessment in pairs, they conduct reciprocal marking where each student identifies two good things about their partner's work and one area for improvement. Then, when feeding back as a class, it is important to get the marker to read out their feedback on the work to everyone else. This emphasises the need for active listening, as the original student needs to listen and can then respond, thus establishing a dialogue between the two students.

A further technique involves students reading out each other's work in pairs and then providing feedback in a cooperative manner. The golden rule for an activity like this is that interrupting is absolutely forbidden; the two students must have a mutual respect for one another because they affect each other's learning landscape.

If a student does misbehave in a lesson or their behaviour in the classroom is not up to standard, an effective strategy is to as ask the student the question, 'What message do you think those around you are getting from what you said/did?'. This encourages them to consider their behaviour and gain self-awareness and self-discipline.

How the layout of a classroom affects the learning that takes place

At the beginning of each lesson, situating yourself at the door in order to greet the students when they arrive can form part of your routine. Being able to welcome them to the classroom can help establish a rapport with your students and demonstrate the mutual respect discussed earlier.

The physical classroom layout should also be as flexible as you can make it to adapt to different types of lessons. The furniture should allow students to move between groups, for example from group work to paired work. There will also be occasions when they will need to return their attention to the teacher, and the furniture should allow for this, too.

Likewise, the teacher should also be able to move around the classroom easily so that they can move between students. On a practical level, students need to be able to see the projector screen and this is particularly important if you are celebrating a boy's work and want to screen mirror from a boy's iPad to show the rest of the class.

THE CULTIVATION OF A REFLECTIVE APPROACH TO LEARNING, BOTH AS TEACHERS AND AS STUDENTS, HAS SIGNIFICANT REACH, RANGING FROM THE DEVELOPMENT OF SELF-AWARENESS AND SENSITIVITY TO OTHERS TO THE ACQUISITION OF PRACTICAL LEARNING SKILLS, A CAPACITY FOR CREATIVE AND CRITICAL THINKING, AND THE REALISATION OF A MORE ETHICAL, RESPONSIBLE FACILITY.

THE KEY TO SETTING THE TONE AND ESTABLISHING EXPECTATIONS IN A LEARNING ENVIRONMENT IS TRUST. IF THE STUDENTS TRUST YOU, THEN YOU ARE IN A GOOD PLACE AS A TEACHER; IF NOT, THE LEARNING LANDSCAPE WILL FAIL.

How to establish a 'safe' learning landscape for students

As long as we reflect, we learn more about ourselves when we fail than when we succeed; however, for us to learn effectively from failure, we must first feel safe in doing so. In a classroom environment, students need to learn fast and effectively. To do this, they need to fail repeatedly and this is why, as teachers, we must contrive 'safety nets'. These safety nets need to be woven into our teaching. An effective way of doing this is through checking for students' understanding.

In my experience, this begins with ensuring that students understand that this is a 'team game' and that both the teacher and the students in a classroom are on the same team. One of the ways this can be achieved is by asking students questions such as, 'Can you raise a hand if you do not understand the concept in hand?'. Perhaps student A might raise their hand – their bravery should be praised – and if they are alone it suggests that the rest of the class feel secure in their understanding.

So the next step is to ask student A to choose one of the students with their hand down – student B – to explain the concept aloud. At this point, student B may attempt to answer; or they may admit that they also do not know – again, their bravery and willingness to admit this should be acknowledged and celebrated – in which case student A asks another student with their hand down – student C – to explain what they understand by the concept in hand. After student C has contributed she/he can ask another student – student D – to add her/his ideas, and so on until the concept has been fully explained.

By checking for understanding in this way, students begin to realise that it is okay not to know the answer; and by celebrating a student's bravery in admitting this, we can help to establish a safe learning landscape for students.

AS LONG AS WE REFLECT, WE LEARN MORE ABOUT OURSELVES WHEN WE FAIL THAN WHEN WE SUCCEED; HOWEVER, FOR US TO LEARN EFFECTIVELY FROM FAILURE, WE MUST FIRST FEEL SAFE IN DOING SO.

DEVELOPING A STEM INITIATIVE

Dr David Hallwood | *Teacher of Physics, Eton College*

STEM (Science, Technology, Engineering and Mathematics) is a commonly used acronym in education, so when I was tasked with developing a STEM initiative, I thought it would simply entail researching and selecting aspects of best practice from what was already happening. After wading through the vast amounts of information online, I became very confused. What does STEM mean in UK education? It is predominantly used to rebrand science and mathematics or as a careers education tool to promote STEM professions. To me, the majority of it didn't offer anything new.

I needed a different approach, so I asked myself, why am I doing this? I developed the statement: to create the next leaders in science and technology who have the skills to solve the future problems of the world. This is a lofty but important goal, and a statement that has allowed me to convince many, if not all, colleagues of the importance of the initiative. The next question was, how am I going to do this?

I first looked at my experiences. I transitioned into teaching after a physics research career. Whilst mentoring undergraduate projects, I was impressed by how well students could get from point A to point B in a project if you gave them clear instructions. Without instructions, however, they struggled greatly even if they had all the knowledge they needed. Furthermore, they were utterly hopeless at finding their own point B, so they couldn't progress the project independently. During the project, they became more independent and some were even able to creatively extend their work in new directions. Their engagement with their work also improved and it seemed to develop their motivation for the subject as a whole. Therefore, I asked myself, could this approach be transferred into secondary education and reverse the decline in motivation towards science?

I was lucky enough to have the expertise of the Tony Little Centre for Innovation and Research in Learning to hand. The Head of Research Programmes produced a detailed research report on the topic. This report focused on progress made in the USA and its conclusion supported my thinking that we should allow students to do group project work tackling open-ended problems. It offered opportunities that are often missing in UK education. Except for Design and Technology and Art and Design, students rarely get the opportunity to tackle problems over an extended period. As a result, tasks are limited to less than an hour, rather than the days and weeks that are needed to think in any depth about significant problems.

Next, we had to ask the question, what are we going to do? The development of the initiative has been a long

journey and I have taken a "fail fast" approach to learning from my mistakes. And there have been many mistakes. Here I will highlight the most important related to project work.

After a request from a parent, we set up a robotics club for Year 9 students to compete in the First Tech Robotics Challenge. We thought that starting with the youngest year group would allow us to develop STEM year by year; however, this had limited success. Year 9 students are the youngest year group at Eton, and the cognitive stress of coming to a new school allowed little capacity to deal with the robotics competition. We therefore decided to focus on Year 12 next as they have few exam commitments and are more settled in the school. The students and I also had no robotics experience and the students needed about four hours of supervision a week, which wasn't scalable without allocated school time. We resolved these two issues by allowing students to pick their projects and limiting contact time to a 40-minute weekly meeting.

The Year 12 projects were more successful, but there were still issues. Students had little concept of what was possible in terms of the scope, risk and expense of the project. For example, one group was determined to make a rocket and were surprised and frustrated when this project was rejected due to cost and risk. We also found the projects students found interesting were different to those that teachers would want to mentor. We resolved these issues by allowing teachers to pick the project titles. Furthermore, it was hard to find times when students could meet with their mentor and with each other, so project progress was slow. This is something we still have to resolve.

We found that the students lacked many skills that we often take for granted, such as basic project management, teamwork skills and the ability to lead a project. Interestingly, an end of project questionnaire revealed that they were more interested in developing these skills rather than the outcome of the project. To resolve this issue we reached out to teachers at other schools. Schools in the USA have been particularly helpful. The education systems are very different. For example, they are not shackled to national exams in Years 11 and 13; however, there is still a lot we can learn. After visiting several schools, it was clear we needed much more structure to the projects. In the next iteration, each group did a 5-week project that allowed them to develop the skills they would need for the main project. Our Head of Research Programmes also developed a skills course that ran alongside the projects and we started the year with a Leadership Workshop delivered by The Commanding Officer of Eton's Combined Cadet Force (CCF).

The changes we have made have helped and we currently have over 50 students carrying out STEM projects. There is still much to improve. Students need time and a space where they can work on the project together and access the resources they need. It is clear that without dedicated time slots in the school day it will be challenging to do this.

I will end by considering the question, can a school justify the time and resources? I would argue we need to apply this question to all parts of current education as well as the STEM initiative and I am confident that it has more value than a lot of what we do. For example, students and teachers spend an exorbitant amount of time on homework when there is little evidence of its benefit. Would it not be better to give students the freedom to think about ideas that they are interested in rather than dictate what they should know? This will result in schools developing students with varied experiences, which is crucial if we are to create the cognitively diverse workforce that is necessary to solve the future problems of the world.

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LOCATION-BASED LEARNING ACTIVITIES TO CULTIVATE STUDENTS' OVERALL ENJOYMENT OF BIOLOGY

Clare McKinnel | *Teacher of Biology, Eton College*

What is location-based learning?

As we are all aware, a pupil's attitude to a subject determines their engagement and achievement. I therefore chose to conduct some research into the factors which contribute towards the positive attitudes of students in my own subject of Biology. Last year I completed a Master's in Education and explored the concept of engagement by using technology-supported outdoor learning experiences. The IGCSE exam board that we currently use for Biology advertises that their content is engaging and up to date, with opportunities to 'localise' the content to make it more relevant for students. Over the last four years of teaching, I have been aiming to achieve this solely inside the classroom (bar one trip to the school field to practice quadrating for a lesson once a year!) and therefore have missed the opportunities that outdoor learning experiences could offer. This, and the recent implementation of iPads for all students within the school, encouraged me to make an effort to capitalise on what is on offer in the syllabus and around the school site.

During a two-week period, the boys in my two Year 10 classes completed four lessons outdoors which focused on the conducive topic of 'Ecology and the Environment' using interactive activities on their iPads. I explored how their involvement in this experience affected their attitudes towards Biology through a pre/post Likert-scale questionnaire, semi-structured follow-up interviews, my observational notes and a self-reflection diary. The findings suggested that student levels of interest and engagement in Biology activities increased significantly. Illustrative quotations from boys such as "it was definitely better than sitting in a classroom. It was definitely more fun" and "being able to take technology outdoors can put the lessons back in context" confirmed the value of the practice.

There were many factors to consider when implementing the outdoor learning experiences. Requests such as "maybe next time it could be, like, a dissection, where we go outside and find a dead sheep or something and dissect that" had to be declined, not least due to health and safety laws. However, the learning environment seemed to have positively impacted on the pupils' attitudes as well as my own teaching practice; specifically, by slowing down the pace of learning, making me realise the positive impact of the outdoors on learning Biology, and motivating me to continue offering such experiences in the future.

Why implement location-based learning?

As Eton is situated beside a river and within several hectares of beautifully open green spaces, the school site can and should provide opportunities for authentic and meaningful learning experiences for the boys. I was inspired by academics in the field who stressed that complementing high quality science learning in the classroom with learning outside the classroom, 'where the world is far richer and messier', will mean that students will experience the subject with more enjoyment and there is a greater likelihood of them continuing on to a higher level (Braund & Reiss, 2006).

When thinking about students' 'attitude' towards the subject – in the sense of the three components: knowledge (cognitive), feeling (affective) and action (behavioural) – it came to light that implementing these outdoor experiences could positively impact most productively on the students' affective domain. Students felt that they engaged more due to the variety, enjoyment, and usefulness of the lessons, although they stressed the importance of its role in complementing rather than replacing the traditional classroom set up. The boys were keen to offer suggestions for the future planning and use of outdoor learning experiences: "if we started a new topic, I think it would be helpful to go outside first and then come inside"; and "I think before an outdoor lesson there should be a lesson or two to learn the content because sometimes when you go off outside to learn something new then time goes quickly and if you're trying to cover lots of content then it can be less useful".

I found that the time taken, the preparation required, the competence (as well as the energy levels) required of the teacher and the compliance of the students were factors that offered both challenges to and opportunities for experiencing and implementing these outdoor learning experiences effectively.

AS ETON IS SITUATED BESIDE A RIVER AND WITHIN SEVERAL HECTARES OF BEAUTIFULLY OPEN GREEN SPACES, THE SCHOOL SITE CAN AND SHOULD PROVIDE OPPORTUNITIES FOR AUTHENTIC AND MEANINGFUL LEARNING EXPERIENCES FOR THE BOYS.

How was the location-based learning implemented?

The lessons I taught in the summer term are outlined briefly below.

1. Understand the term biodiversity

Students were given a map of the site with trees to find and identify at specific locations.

2. Understand the terms population, community, habitat and ecosystem

Students found specific locations using an app on their iPads and completed activities that ranged from taking and annotating photos to designing their own improved versions of the site.

3. Investigate the population size of an organism in two different areas

Students designed their own investigations to explore the impact of population size on a plant species.

4. Sexual reproduction in plants

Students were asked to find a flower of interest around the site, to research it, and to produce a flower ID page to add to a field guide that we produced as a class.

Final Thoughts

As I reflect on these findings and the positive impacts the outdoor learning experiences have had on the boys, I question why there is a lack of effort to take subject learning outside. Making use of the outdoors in Biology lessons is especially helpful for those children who view Biology in a negative light. One student noted, "overall I enjoyed it. I think if we had it earlier – maybe year 7, 8 or even 9 – I think more people would want to study Biology if you see the big picture not just like the classroom and syllabus." Another student confirmed, "I think if any subject could do what we were doing then it would probably be Biology as it seems like the most useful as we're learning about the things around us so I think it should be part of our subject."

Though this study had its limitations, the boys evidently enjoyed the experience, and though it took time planning the lessons, the project allowed for the development of robust resources that can be re-used or adapted in the future. These lessons encouraged collaboration with colleagues, and the framework could be tailored to fit the timings, size, and requirements of the class. The concept of these lessons could suit any school that has an outdoor space and plant life. Those with less flexibility during lessons in the school day could use the resources after formal school hours, perhaps during science club, and those without devices could print the trails and activities on paper. If a school does not have any outdoor spaces which is appropriate to use, then the classroom could be adapted to 're-create' an ecosystem in the outdoors for students to identify or sample different organisms, and here perhaps the use of technology could be even more relevant. My mantra is "the more you know, the more you see", in contrast to seeing in order to know. Purposeful learning adds a depth of understanding for the pupil as well as cultivating enjoyment of the subject matter at hand.

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AS I REFLECT ON THESE FINDINGS AND THE POSITIVE IMPACTS THE OUTDOOR LEARNING EXPERIENCES HAVE HAD ON THE BOYS, I QUESTION WHY THERE IS A LACK OF EFFORT TO TAKE THE SUBJECT LEARNING OUTSIDE. MAKING USE OF THE OUTDOORS IN BIOLOGY LESSONS IS ESPECIALLY HELPFUL FOR THOSE CHILDREN WHO VIEW BIOLOGY IN A NEGATIVE LIGHT.

REFLECTIONS UPON REFLECTING

Richard J Doorbar | *Teacher of Divinity, Eton College*

What is this life if, full of care,
We have no time to stand and stare.

('Leisure' by William Henry Davies)

We live in a very fast-paced world in which the rate of change is exponential. Jobs will be available in the future which we cannot even conceive of today. As we all know from the Covid-19 pandemic we are having to adapt to change at a startling pace. However, first we need to consider what skills are vital to living a 'flourishing' life in the future. Areas I have in mind are creativity, imagination, intuition, emotions and ethics. These are domains that are distinctly human and cannot be replaced by technology as expounded by Gerd Leonhard in his YouTube clip about technology and the future.

The key question for me is: how do we provide opportunities for reflection in a lesson and indeed, why is this necessary? The answer to this, in my opinion, is that only by learning to reflect can we engage with our emotions and learn the skills to enjoy life at a deep level. If we do not provide time for reflection then we are unlikely to grapple with the deep questions of life such as: Why am I here? What makes me unique? What is my purpose in life? How can I be truly happy and content? What is the right thing to do?

My view is that we must provide space and time for reflection in the schoolroom. We should seek out opportunities to consider, in the words of Peter Berger, 'signals of transcendence'. In other words, we should reflect on those experiences that take us to a 'deeper' place: a place of transformation, a place of 'awe and wonder', a place of humility. In order to explore this notion further I shall provide a few examples from my own teaching which, if given sufficient reflection, can lead to transformation.

In a lesson where we read the inspirational speech by Colonel Tim Collins given shortly before the invasion of Iraq in 2003, I provide pupils with a periods of silence so that that they can truly absorb the depth and meaning of not only the speech as a whole, but pertinent parts of it. Sometimes learning at a deep level requires no commentary; it simply requires an inner thoughtful response, and this can lead to learning which far exceeds knowledge, understanding and analysis. Perhaps there is some learning which transports the student to a place that they did not even know existed. Our job therefore is to journey with our students and show them that we too are also learning and being transformed during the lesson.

This need to pause and reflect can also be found in music. Music teaches us of the power of the pause; that period of silence in a piece can somehow take us to a new

PERHAPS THERE IS SOME LEARNING WHICH TRANSPORTS THE STUDENT TO A PLACE THAT THEY DID NOT EVEN KNOW EXISTED.

dimension and enable us to reflect and be transformed. Such pauses are to be located in Jazz and all great works, for example in *Messiah* by Handel. But what does the pause do? It allows us time to 'notice', or sometimes it forces us to become more alert because we may not have expected the pause. I think therefore that pauses are essential to reflective and indeed spiritual living.

Teaching students about the ancient Greek mythical artefact, the Ring of Gyges, has provided countless opportunities for pause and reflection. The ring enables its owner to become invisible and in the original story the shepherd Gyges is transformed into a power-mad, greedy killer. Gyges' anonymity transformed him into an unjust and self-centred character. The question here is: are ethics just about being 'seen' to do the right thing or are some things simply wrong per se. As C. S. Lewis stated: "Integrity is doing the right thing, even when no one is watching". Pauses for reflection on what makes something right and wrong are fundamental to the learning process about values and the importance of developing into what Maslow labelled the 'self-actualised' and indeed 'transcendent' personality.

Peter Berger in *A Rumour of Angels* points to the importance of humour in transporting us to a more spiritual dimension of life, and humour in the schoolroom can be regarded as an integral element of the learning process. The very act of humour encourages reflection and I have used this when teaching about the nature of argument at A Level. One example of this technique is to consider the sketch 'Argument Clinic' from Monty Python, which exposes the nature of argument in a light-hearted way. The sketch highlights what constitutes a powerful argument and the way in which arguments can also be trivial. It is humorous and, in many respects, merely requires a pause of reflection in order to appreciate its underlying message. Words to examine it are almost superfluous. The other point that Berger makes is that humour can also transcend our everyday experience, and as a result gives it a sense of perspective and proportion. In other words, humour enables us to be transported to a 'deeper dimension' because it goes beyond the surface experience of life.

When teaching about *Via Negativa* as part of the nature of religious language, one can focus on the 23rd Psalm. There is a deeply moving section in the film *The Elephant Man* in which John Merrick recites the 23rd Psalm. The poignancy of this centres on the fact that physicians had thought that John Merrick was unable to speak. His recital of the Psalm reflected the fact that John Merrick was highly intelligent and indeed educated and that it was wrong to conclude that his physical appearance was synonymous with his intellectual ability. I suppose in many respects the message of the clip was 'do not judge by appearances'. A reflective pause following a viewing of the clip or a perusal of the script enables boys to reach their own conclusions and realise that life is not always what it appears to be. This can be far more powerful and deeply affecting than using words. Sometimes words can seem inadequate in situations such as this and reflective thought leads to a deeper, intuitive level of understanding. Over the last term, I have sought the views of F Block (Year 9) boys on the importance of reflection and 'pauses' in their learning within Divinity lessons. Below are a selection of their responses:

'Reflection and pauses are important because they allow for personal reflection on your own actions or what you have to do in the future concerning what you have seen or heard.'

'It gives us time to think about what we are going to say.'

'It is good to reflect on it straight away as any immediate thoughts will be forgotten quickly.'

'You have time to establish an opinion and take in what you have seen or heard. It also seems disrespectful or inappropriate to carry on immediately after a powerful moment as people need time to overcome their emotions.'

'It gives boys time to 'digest' the information and mull it over in their heads.'

'I think that periods of reflection are important as they allow you to gather your thoughts and think more carefully about the subject.'

'A pause gives the idea an importance, almost a prompt for further thought. Instead of just rushing on…'

'Some things are just difficult to understand – a quick pause is perfect for you to regather your thoughts and properly understand what is going on.'

'Reflection is important to take in the seriousness of a topic or conversation.'

'I think moments to reflect are very important as it not only slows down the lesson pace, making things easier to sink in; it also gives time to think of answers or questions to what has just happened.'

'It is important because after a strong or powerful idea, having a pause is good so you can think about the thought deeper.'

'A PAUSE GIVES THE IDEA AN IMPORTANCE, ALMOST A PROMPT FOR FURTHER THOUGHT. INSTEAD OF JUST RUSHING ON…'

I think you will agree that the responses of these boys are very profound. They recognise the value of a pause in order to appreciate issues on a deeper level. They also appreciate the value of pauses when topics are emotionally laden. They do not accept the orthodoxy that 'pace' in a lesson is the only answer to good teaching and learning and they recognise that a pause enables them to assimilate thoughts and ideas more comprehensively.

This piece has argued for the importance of time to 'reflect' in lessons. It argues that profound insights can be the result of such reflection, and that reflection is the pathway to an 'in depth' level of response that can provide spiritual insight. Indeed, reflection is a vital pathway to 'signals of transcendence', and therefore we need to provide opportunities for reflection so that boys can use this as a modus operandi not only in lessons, but as they journey through life. Such opportunities will not only allow them to flourish and live life to the full, but also to maintain balance and equanimity in an increasingly fast-paced, demanding world.

What is this life if, full of care,
We have no time to stand and stare.
('Leisure' by William Henry Davies)

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DEGROWTH IN EDUCATION:
APPLICATION TO SCIENCE

Sam Shields | *Acting Head of Biology, Eton College*

What on Earth is Degrowth?

Our society is built on a promise of endless growth: the capitalist model of more goods, more services, more time and more profit. It is very clear that we are living beyond our means. Whether it is significant inequality, climate change, ocean acidification or one of a hundred other crises, this message of endless growth is unsustainable. Sustainability is often focused on doing less. Reduce, reuse, recycle. It's a message of "lower your carbon footprint" and never "what else could a footprint be made of?"

In contrast, degrowth is a relatively recent movement that seeks to challenge the presumptions of capitalist societies and the false model of infinite growth that they are founded on (D'Alisa et al, 2015). Unlike sustainable development, which focuses on how to achieve traditional means and ends in a more ecologically-friendly way (Glavic, 2020), advocates for degrowth would instead look to scrap the current, gluttonous appetite society has and implement new systems and new solutions entirely. Hence, a degrowth mindset can be applied to the manufacture of goods, but also to the provision of services like healthcare and education.

EDUCATION IS NOT IMMUNE TO THE PRINCIPLE OF UNENDING GROWTH. WE EXPECT LEARNERS TO ACCUMULATE MORE KNOWLEDGE, MORE QUALIFICATIONS AND MORE DEBT TO SECURE A LIFESTYLE THAT SOCIETY PAINTS AS ATTRACTIVE.

Applying Degrowth to Education

Education is not immune to the principle of unending growth. We expect learners to accumulate more knowledge, more qualifications and more debt to secure a lifestyle that society paints as attractive. Similarly, teachers are expected to take on increasingly broad professional responsibilities, collect data and forever expand their knowledge. The digital education sphere is not immune to these issues, either. If anything, with the prevalence of ed-tech designers, freelance educators and institutions online, the culture of growth and accumulation is compounded as this excess of actors flood the virtual ecosystem with products, content, micro-credentials and qualifications.

So how might a degrowth mindset help to steer education away from the capitalist trappings of society, towards producing beneficial, equitable teaching for learners, instructors and institutions?

The literature on degrowth can often appear quite divisive, as might the literature for any new movement first finding its feet. But there are four major pillars when approaching degrowth:

Simplicity: Simplicity seeks to do things differently, to tear down and start fresh. This is in contrast to the sustainability approach of doing less of the same.

Conviviality: Conviviality emphasises collaboration and the notion of creating together as a community.

Care: Degrowth has, at its heart, a focus on the wellbeing of the individual. Only by caring about the people in a society can that society thrive.

Ritualised destruction of accumulation: The destruction of accumulation looks to erase the capitalist culture of excess. In practice, this could mean steering away from excessive data-gathering in the form of grades and standardised exam scores.

Reflecting on Professional Practice

It may be beneficial for a teacher to reflect on how each pillar is being incorporated into their own practice. Some of the questions below may also be relevant at a department and managerial level.

Simplicity: In order to simplify, to tear away what has been done before and do things differently, we need a little creativity. The ability to improvise and innovate is key to degrowth. A classic degrowth example is the composting toilet (Vetter, 2018). Traditional toilets consume a lot of water to ferry waste elsewhere. What if we imagined a toilet without water? One that dealt with its own waste too. And so, the composting toilet is conceived. No water is needed. It is able to break down waste rather than shipping it on. While traditional sustainability would perhaps ask, "Can you use the toilet less?" degrowth seeks to ask, "Can we redefine what a toilet is?"

What is your educational toilet? What are some of the inefficiencies, wasteful practices and challenges you currently contend with? What is it to be innovative in your subject? How can you be encouraged to explore your creativity?

Conviviality: Applying a degrowth mindset to education would mean emphasising interdependence. It is not enough merely to be aware of the need to work with others; we should foster opportunities to form a symbiotic relationship with others through community and collaboration.

What does collaboration look like in your classroom? How often do you collaborate with other teachers and other departments? Who have you never worked with before and what could you offer each other?

Care: Care in education can be tricky to achieve when so many stakeholders have different needs and goals. A teacher must balance caring for their students with looking after themselves, their teams and the aims of their institution. In education, a learner, teacher and institution can often have radically different ideas of what success looks like and how to achieve it.

How would you define success? How does this compare with the aims and needs of your students? How can you challenge students in your subject while maintaining their wellbeing?

Ritualised destruction of accumulation: Each year we start new mark books, develop new resources and often borrow lessons and ideas from other teachers. Facilitating this is a seemingly endless amount of digital storage space, filled with countless resources and data galore. But is this the best use of our technologies?

How do you emphasise quality over quantity in what you do? How is the data you gather being used for the educational benefit of your students? Which resources have gone unused this year and should they be kept?

In Conclusion

I hope this has encouraged any teachers reading to reflect on their practice through a new lens: one that aims to maintain professional integrity while improving wellbeing and outcomes for students.

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I HOPE THIS HAS ENCOURAGED ANY TEACHERS READING TO REFLECT ON THEIR PRACTICE THROUGH A NEW LENS: ONE THAT AIMS TO MAINTAIN PROFESSIONAL INTEGRITY WHILE IMPROVING WELLBEING AND OUTCOMES FOR STUDENTS.

BEHAVIOUR MANAGEMENT

Oli Cooper | *Teacher of Design, Eton College*

When reflecting on how my teaching has developed and changed over my career, I am aware that there are innumerable things I have developed, tweaked, or revised since I first began. The aspect of my teaching that has changed most subtly, yet perhaps with the greatest impact on the day-to-day experience of my work, has been behaviour management. Although much of this is because of the context in which I am fortunate enough to work, I hope this article offers helpful insights to those teaching in any context.

I now teach in the Design Schools at Eton, but my experience of education and behaviour management more broadly began when I coached sport in the late 2000s. Much of my coaching involved classes of up to sixty amateur gymnasts ranging from beginners to aspiring elite athletes, and leading a team of coaches over afternoons, evenings and weekends. This introduction to managing behaviour meant I began my career feeling comfortable in hectic environments, ready to be heard across large distances, and confident to jump in to direct learners (or athletes) quickly.

The understanding I built about behaviour management through coaching and teaching Design and Technology before my PGCE was simple and focused on ensuring students' obedience. I thought of behaviour management as a response to 'bad' behaviour and as a requirement to maintain order in a schoolroom full of lively children who are beginning to test the boundaries set by adults. Becoming a teacher and then beginning a PGCE gave me the first opportunity to examine behaviour as a discrete part of pedagogy.

My lectures with Roland Chaplain framed my perception of behaviour management as policy focused on students with difficulties or who diverged from the norm of 'well behaved' learners. The subtitle of Chaplain's recent book suggests this perspective: "A practical approach to managing pupil behaviour" (Chaplain, 2016). This was perfectly suitable and helpful for the trainee teachers on primary and secondary PGCE courses but it contrasted with my experience greatly. In groups and classes that included athletes or learners with these difficulties, good policy and processes provided a solid foundation, but only to avoid 'bad' behaviour or to incentivise compliance.

The first time I began developing some nuance in my thoughts on behaviour came after the final observation by my truly inspiring subject mentor, Bill Nicholl. When we shared our experiences as a Design and Technology cohort back at university he suggested that the best behaviour management is a well-planned lesson that is genuinely interesting and engaging. That said, it is easier to advocate well-planned lessons or engaging activities than to consistently roll out gold standard lessons every day.

I have increasingly found the framing of activities and lessons to be as important as the activities themselves. By increasingly asking for behaviours from my students that reflected what designers and engineers would do in industry, I began to see and hear my students consider behaviour differently. This was the case even during activities they'd done before. It was no longer a stick to discourage being nefarious, but an incentive for them to better show their learning and progress. A good example was the GCSE Design and Technology coursework, where much of the content seemed like jumping through hoops for the students rather than the design process in which I had trained and practised. In reality, though, every part of that process does mirror activities on which designers and engineers in industry spend their time daily. Once I widened my perspective of the real world of design and engineering it was much easier to encourage students to engage more consistently and reach higher levels of success.

Improvements in student engagement and progress were the result of many changes, including the following:

- Greater clarity of expectation of 'good' behaviour, i.e. behaving as a designer or engineer would
- Explanation of the purpose of the activities in my lessons, i.e. how they are linked to the real world
- Breaking down, explaining, and modelling steps professionals take to complete tasks or activities
- Opportunities to encourage students to fail and retry at tasks in similar ways to professionals
- Providing language to encourage students to think of how they are acting like professionals

BY INCREASINGLY ASKING FOR BEHAVIOURS FROM MY STUDENTS THAT REFLECTED WHAT DESIGNERS AND ENGINEERS WOULD DO IN INDUSTRY, I BEGAN TO SEE AND HEAR MY STUDENTS CONSIDER BEHAVIOUR DIFFERENTLY.

Overall it allowed me to consider behaviour more positively, and it allowed students to practise thinking and acting as designers and engineers.

While it can be easy to say what has worked in one context, I believe it is more important for an article such as this to suggest what approaches other teachers can use. The two simplest pieces of advice I might give are to control what you can, and to monitor industry or professionals as much as possible.

Policies for behaviour management in schools are often somewhat set in stone, and certainly are not for changing daily. The culture you develop in your teaching is under your control, though. Even by simply framing activities and tasks in ways that seem more authentic, I have found students are ready to be more engaged. If the context is explained to students concerning what the task or activity might look or feel like to a professional, students are often more ready to tackle a challenge.

Much of this is predicated on knowing what industry or working as a professional is like. In Design and Technology this can be easy, with designers and engineers increasingly sharing their work on social media. Subject-based associations are also a good place to start for those still somewhat new to their career.

In short, I have found that small changes in language and framing can help reposition behaviour management as a powerful way for learners to better understand their studies.

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EVEN BY SIMPLY FRAMING ACTIVITIES AND TASKS IN WAYS THAT SEEM MORE AUTHENTIC, I HAVE FOUND STUDENTS ARE READY TO BE MORE ENGAGED. IF THE CONTEXT IS EXPLAINED TO STUDENTS CONCERNING WHAT THE TASK OR ACTIVITY MIGHT LOOK OR FEEL LIKE TO A PROFESSIONAL, STUDENTS ARE OFTEN MORE READY TO TACKLE A CHALLENGE.

A PANDEMIC OF PRACTICALS:
A VIEW FROM THE BENCH

Dan Townley | *Head of Science, Eton College*

I am cautious of titling an article with the word 'pandemic', but I feel the title is fitting given what I hope to be able to discuss in the short space below. The 20th March 2020, the date that all schools in the UK were mandated to close, might feel like a distant memory and one that we are trying to forget, but the impact in the science laboratory will be felt for years to come.

With school laboratories and prep rooms securely locked and chemical bottles collecting dust on the shelf, teachers rushed to improvise ways at home which they might use to deliver practical skills through the medium of Zoom. Enjoyable though it may have been instructing students to raid the kitchen cabinets to find baking soda and malt vinegar to generate carbon dioxide gas to extinguish a candle, the result was of little significant gain. We are left with a cohort of students with little capacity to work effectively and safely in a laboratory.

ENJOYABLE THOUGH IT MAY HAVE BEEN INSTRUCTING STUDENTS TO RAID THE KITCHEN CABINETS TO FIND BAKING SODA AND MALT VINEGAR TO GENERATE CARBON DIOXIDE GAS TO EXTINGUISH A CANDLE, THE RESULT WAS OF LITTLE SIGNIFICANT GAIN.

So, what do we do to address these gaps? The return to school led to a massive rush from teachers to try and 'catch-up' on these lost skills. Science technicians up and down the country were run off their feet trying to re-stock PPE, check the sell-by date on their supplies, and prepare innumerable practicals, all whist trying to maintain social distance, quarantine equipment, and devour a seemingly endless stream of Milton tablets. How they got through it all is beyond me, and I am truly grateful to all science technicians across the land; we science teachers are nobody without our technical support.

Now my question really is: why did we do it? What was the value of all of those practical exercises crammed into three months? What did our students take from endless recipe following, to emerge with the sole seeming success of dirtying glassware? I think, in short, not a great deal.

In my experience when you tell a class that they are doing a practical they get excited. This is not necessarily because they enjoy practical work, or they feel it will enhance their learning, but often because they feel it will allow them to do less – a chance to chat to their friends perhaps, whilst mixing a few things in a test tube to little meaningful result. I recently instructed my own chemistry class in the preparation of Copper Sulfate Crystals. After forty minutes of work what did we have? A mess, and not a lot else. The question has to be: is there a better way of doing this? Where are we going wrong?

A comment that sticks with me from my own education was that from John Driver, Head of Chemistry at Repton School – delivered in his strong Yorkshire accent: "Forget about practicals, you cannot do better than a quality demonstration". I feel this statement has a lot of mileage, in Chemistry at least. Too many practicals result in missing or incorrect observations which do not align with the textbook, and confused students who do not really know what they are doing. A well-structured demonstration on the other hand can allow the deliverer, and not necessarily the teacher, to take slow, explained steps to reach the learning objective.

One of the benefits of the exponential technology learning curve that we have climbed is that we are much more at home with the use of cameras and recording equipment. In my own classroom I often set up a Zoom call with no participants apart from myself which allows me to connect the camera from my phone directly to the display screen. This means that students really can see what I am referring to when talking through the demonstration. One thing that has been fascinating to see is that students of the current generation are more comfortable watching the live event reproduced through the projector rather than seeing in front of their very own eyes! This is alarming in many ways.

That does not mean that there is no place in the school laboratory for practicals; we are, as they say, a practical subject. So how do we, as science teachers, ensure we make effective use of them?

One thing that we have been trialling in my department is the concept of the 'slow practical'. In this model there are no method sheets, or outdated and conflicting instructions. Instead students are gathered around a demonstration bench where the teacher explains what they are doing, and most importantly, why they are doing it. They then execute a step by step demonstration, sending the students back to their own work spaces to replicate, building up the work in manageable chunks. The technology in the classroom allows students to capture every step of the process using the cameras on their own devices, and integrate these into their own practical resource and revision notes.

The result is a calm and ordered environment, where students understand the different steps they are carrying out, and common errors and misconceptions can be ironed out at the start. Ironically, a 'slow-practical' takes less time than a traditional one, and the output is no longer a soggy sheet of paper with smudged scrawl on it, but a series of annotated images that can be pulled straight through to the revision folder.

Naturally, as students develop their practical skills while they progress through the curriculum and reach post 16 courses where they are expected to plan their own experiments, this method becomes of less value; but lower down the school it has certainly made significant changes in the way that I and others in the department use practical work.

Perhaps when you return to the laboratory after the summer break, and are rushing to get in all your practical requisitions before the end of INSET, think this: could I do this through a demonstration, and should I 'take it slow'?

THE TECHNOLOGY IN THE CLASSROOM ALLOWS STUDENTS TO CAPTURE EVERY STEP OF THE PROCESS USING THE CAMERAS ON THEIR OWN DEVICES, AND INTEGRATE THESE INTO THEIR OWN PRACTICAL RESOURCE AND REVISION NOTES.

SPOTTING THE ROT: USING MEDICAL CRITICAL APPRAISAL TOOLS ON EDUCATION RESEARCH

David Gibbons | *Teacher of English, Eton College*

"Nothing that you will learn in the course of your studies will be of the slightest possible use to you in after life – save only this – that if you work hard and intelligently you should be able to detect when a man is talking rot, and that, in my view, is the main, if not the sole, purpose of education." (John Alexander Smith's words to Harold Macmillan's Oxford class, 1914, cited in Barrow, 1999)

An analogy: dopesick and education research
Dopesick, the Disney+ mini-series unpicking the rise of the use of the 'non-addictive' 'miracle painkiller' OxyContin (spoiler: it was very addictive), reveals a once troubling relationship between the medical establishment and research evidence. I reference it because I believe it usefully models education's relationship with research evidence today.

When doctors and patients raised concerns that OxyContin was addictive, might not be as effective as promised, and had unforeseen consequences, these concerns were allayed, not with research evidence, but with patter. Sales representatives were trained to tell health providers that:
• "OxyContin potentially creates less chance for addiction than immediate-release opioids"
• "Patients who took OxyContin would not develop tolerance to the drug"
• "[Oxycontin] had less abuse potential"

When those with questions pushed harder on the subject, it turned out that there was some evidence. A trial cited by nearly every pain-lobby group the Sackler Foundation had set up, found addiction was not a physical reality. This trial was a single 'paper' written in the 1980s which consisted of a five-sentence observation sent to The New England Journal of Medicine, ending with 'we conclude that despite widespread use of narcotic drugs in hospitals, the development of addiction is rare in medical patients with no history of addiction'.

On those five sentences, rest so many ruined lives.

The rise of evidence-based practice
Though the era of evidence-based medicine had begun long before the term was coined, the 1990s saw the advent of its use across the medical establishment (Zimerman, 2013). Whether the rise of evidence-based medical movements happened coincidentally as an opioid crisis generated by a lack of evidence and methodological rigour was taking off, or whether as a reaction to this crisis, is an historical irony hard to unweave.

Education faces a similar predicament to medicine in its relationship with research and evidence. What is cited as evidence often relies on studies that are methodologically unsound, that are too narrow, of a particular era, difficult to replicate, or focus on cohorts where the findings cannot easily be transferred (Ahn, Ames, Myers, 2012).

In education, the challenge we face is similar to that faced by doctors in the 1990s, but with additional difficulties. We are similarly rushed off our feet, and taking time to scrutinise a research paper is difficult to justify when a pile of marking awaits. But even if time were carved out by teachers to explore the validity of pieces of research, another impediment faces us: most teachers are not trained in methodological validity of particular frameworks as part of their training.

The effect of this lack of training is two-fold: first, it makes teachers unable to contribute to education research that will guide policy at a departmental, school, or national level; second, it leaves teachers unable to distinguish between research which has some validity from that which has little.

Fortunately, we can learn from medicine's mistakes. The medical establishment began tackling the issue of raising the standards of critical appraisal, or how to spot 'rot' in John Alexander Smith's terminology, amongst doctors many years ago. Teachers should be adapting the tools the medical establishment use.

One of the most famous organisations training doctors in the skills of research appraisal is The Critical Assessment Skills Programme (CASP), which developed in the medical community in the early 90s. The organisation's creation was a response to clinicians using interventions that were either contradicted or not supported by evidence in the 1980s. The original project (Getting Research into Practice in the 80s) identified a lack of appreciation among managers and policy makers for the importance of using research evidence to inform decisions, which led to educational workshops to address these deficiencies. Out of these workshops, CASP was born; it is now an international organisation guiding medics through different types of research through their educational frameworks and workshops.

CASP provides eight critical appraisal tools designed for use when reading research. These are for Systematic Reviews, Randomised Controlled Trials, Cohort Studies, Case Control Studies, Economic Evaluations, Diagnostic Studies, Qualitative studies and Clinical Prediction Rule.

Of course, education research and medical research differ in many ways and there are limitations to adopting all of their evaluative tools wholesale. However, there are also many areas which do overlap, the most obvious being qualitative studies, which form a large part of education research.

To the right is CASP's first three questions when reading Qualitative Research. Though the form is clear, I have added three tips I follow when reading educational research.

Three tips

1. One of the best bits of advice I was given when conducting research was that as soon as one introduces an 'and' into the title of a research question, the research outcomes become more complicated to establish. Spotting an 'and' does not mean a piece of research is 'rot' but it does mean that there are multiple parts to think about when gauging its validity.

2. The second question of the CASP framework requires medics to skip straight to the methodology, usually section 3 of any piece of research. One of my guiding principles when evaluating methodology is seeing if there are any precedent studies that the piece cites.

3. The best question, in my opinion, is that compressed between questions 2 and 3. It can save a lot of time. The point of this question is not to rubbish the research outright but to see if there is any validity in it. Some bits of research might be partially unsound, but still have some validity. If the research has some validity, it might be worth considering if the research is applicable to the local environment. After all, though reading a piece of research on, say, setting in a mixed ability comprehensive school may have validity, if it is applied at a top-performing academic institution where most of the students are high achievers, the research findings will not be comparable.

CASP

Paper for appraisal and reference: ....

Section A: Are the results valid?

1. Was there a clear statement of the aims of the research? — Yes / Can't Tell / No
   HINT: Consider
   • what was the goal of the research
   • why it was thought important
   • its relevance

Comments:

2. Is a qualitative methodology appropriate? — Yes / Can't Tell / No
   HINT: Consider
   • if the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants
   • Is qualitative research the right methodology for addressing the research goal

Comments:

Is it worth continuing?

3. Was the research design appropriate to address the aims of the research? — Yes / Can't Tell / No
   HINT: Consider
   • if the researcher has justified the research design (e.g. have they discussed how they decided which method to use)

Comments:

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OF COURSE, EDUCATION RESEARCH AND MEDICAL RESEARCH DIFFER IN MANY WAYS AND THERE ARE LIMITATIONS TO ADOPTING ALL OF THEIR EVALUATIVE TOOLS WHOLESALE.

SPORT PHILOSOPHY AT ETON:
CREATING AND NURTURING THE BEST POSSIBLE SPORTING EDUCATIONAL ENVIRONMENT

This is the narrative of an interview given by **Nico Flanaghan | ***Director of School Sport, Eton College, to* **Jonnie Noakes;** *narrative by* **Kayleigh Betterton**

Creating the best possible sporting educational environment

One of the current issues in school sports is the varying rates of physical growth and development between students. To address this, schools need to mimic Academies and have a greater focus on 'bio-banding'.

Bio-branding is the process of grouping athletes on the basis of growth, maturation and sporting ability, as opposed to basing this decision on chronological age. When teams are not grouped in this way, you can have discrepancies between players. For example, at Eton there is a significant difference in the weights of boys playing rugby per year group, as you can see here:

All of the A-team of F Block [Year 9] were over 70kg. All of the A-team of E Block [Year 10] were over 75kg. All of the A-team of D Block [Year 11] were over 80kg. All of the A-team of C and B Blocks [Years 12 & 13] were around 80kg plus.

However, if one looks at the F Block year group as a whole, there was one boy who weighed more than 130kg and another boy who weighed 50kg. Despite these significant differences in weight, both boys could end up on the same pitch. As a result, the smaller boy may not feel safe on the pitch; and if a player does not feel safe, then they will not be in the right headspace to make decisions.

Other benefits include allowing students to thrive in their bio-band, as opposed to feeling left behind because their bodies have not developed at the same rate as their peers' bodies. If a 50kg 16-year-old boy is banded with younger boys, it is likely that he is more experienced socially, and therefore would take up a leadership role in the team, allowing them all to work on their communication skills. The younger students gain from playing with an older student as they are more likely to take on strategies and tactics derived from the older student's greater development.

Educational benefit of sport

In schools, the educational benefit of sport needs to be maximised. In an age where the education system is dominated by a focus on grades and league tables, schools can become habituated to valuing outcomes above all else. Although schools do need to focus on these things, if they want to enhance their students' sporting ability, there needs to be a greater focus on process rather than outcome.

In sport, the final score does not always reflect the bigger picture. Even if a team loses a match, the players may have done independent coaching sessions, practised in all-weather conditions or spent hours planning strategy. Therefore, the bottom line of the score tells you very little about the educational experience and educational value of the process.

At Eton, over 100 colleagues each term coach a sport and it is important to spread our philosophy. These coaches are primarily educators and even though they may not be an expert in the sport, we trust our colleagues to be able to educate. In an ideal world, there would be considerable training for masters in how to coach certain sports built into their professional development. This is essential as coaching also requires thinking time alongside practical approaches, and this can be difficult to provide in a busy boarding school environment.

How does Eton define the educational value of sport?

Firstly, we need to consider why boys want to sign up for sport. At the higher level, they tend to sign up because they want sport to play a bigger role in their educational experience here at Eton. Their education starts to include more opportunities to learn about sport and more about themselves. As a result, at this level there tends to be a greater buy-in from boys and we begin to do more analysis sessions to support boys in peer- and self-assessment of performance.

Secondly, the main thing that sport can offer students is an awareness of how their behaviour can impact on those around them, and vice versa. Sport can teach students personal resilience in a way that differs from the classroom, and playing sport with someone for an hour can often reveal more about that person – and yourself – than doing anything else.

Finally, Eton supports the educational value of sport by creating as many opportunities as possible. We run 29 sports. A number of sub-environments – teams, for example – operate to make the students' experiences more meaningful. In each of these sports, Eton tries to instil a number of key values and these help to establish our sporting philosophy: performance, participation and enjoyment.

Key values

1. Process is greater than Outcome
2. Reflection on how to improve
3. Resilience
4. Learning about winning
5. Communication and team skills
6. Redefining 'failure'
7. Trust and relationships
8. Motivation
9. Independence

Is there an ideal philosophy of sport in schools?

Performance is just one pillar of Eton's sports philosophy, and has to be taken into account alongside participation and enjoyment. A recent study into grassroots sports claims that when the researchers spoke to players about why they do sport, only a small percentage talked about extrinsic motivators, such as 'winning'. Performance is important, but so too are team dynamics and team values. A team has to ensure that all players are working together in order to achieve the same goal. This goal should not be about winning, it should be about everybody playing the best version of that sport that they can play. Only if a team succeeds in doing this is there a chance that they could win that match.

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ETON TRIES TO INSTIL A NUMBER OF KEY VALUES AND THESE HELP TO ESTABLISH OUR SPORTING PHILOSOPHY: PERFORMANCE, PARTICIPATION AND ENJOYMENT.

THE PINK BALL OF PRESSURE:
CHAOS PRACTICE FOR PASSING OR CATCHING
Dr Tim Beard | *Teacher of French, Eton College*

The rationale for 'chaos practice' for passing and catching not only comes from evidence-based research but also from conversations with Nathan Leamon, England and Wales Cricket Board's Lead Analyst, about skill acquisition. Firstly, learning is best achieved through a combination of repetition and variation, and the success rate that equates to the best skill acquisition is between 50 to 80 per cent. The second is self-evident: a sports training activity should be fun and involve everyone running around. Eton's coaching philosophy of participation, performance and enjoyment also underlies these activities.

In designing a skills practice for passing, catching and throwing a ball, according to the theory, a success rate of 100 per cent is no good – passes must be dropped or go astray, catches must be missed. In fact, a success rate between 50 and 80 per cent is optimal. As a coach, this can be difficult, and it certainly takes players a while to get used to, because it feels as though many things are going wrong. Repetition and variation is necessary for embedding the skill – according to skills acquisition theory – therefore, the individual needs to have plenty of catches and passes until these activities become automatic and they become 'unconsciously skilled'.

That is not to say that practices such as these neglect technique: learning a new skill (fingers-up catching, left-hand passing, wrong foot passing, for example) can be the point of the practice session, if desired. There needs to be a certain number of misses, as the chaos creates pressure by involving distraction in the practice. You would probably not do this kind of practice the day before a match, however, when confidence-building might be your main aim.

Bringing the chaos to the situation affects the success rate and therefore helps the learning.

Bringing the chaos to the situation changes the focus and therefore helps the skills become unconscious.

Bringing the chaos to the situation increases the fun.

Here's an example: take five cones and space them in a very approximate circle at irregular intervals from each other. Start with one cricket ball and two or more players on each cone. The players throw the ball two cones to the left and follow it. Introduce a second, or third ball to keep everyone moving. Irregular distances make for different types of catches and throws. This works just as well as a rugby practice or a football, hockey or basketball practice.

Add chaos by introducing different types of catches and receipts: one handed for instance, or passes off the weaker hand/foot every second time. Add different styles of passing and throwing: on the bounce or fewer touches to control, for example. The coach can also make a lot of noise, or no noise at all, or ask the players to call out the name of the person they are passing to, or the wrong name, or skip instead of running. You could also introduce different types of balls, time constraints, and so on.

Here is another example: line the players up facing each other about two metres apart to begin with, and two metres from each other side by side. Everyone on the top side has a ball except the last man on the far end. Everyone on the bottom side is directly opposite the player on the top side. Players on the top side pass the ball straight across and, when there are no more balls for them to pass, run to the far end of their top line. Players on the bottom side pass the ball diagonally across to the player on the top side, and when there are no more balls to pass, run to the far end of their bottom line. In theory, this is an infinite practice.

You may have to restart several times before everyone gets the idea, but that is part of the point. Add chaos by walking up and down the middle encouraging everybody, or change the distances between players by adding a corner. The coach can observe good technique in this drill too, if required. Coach feedback can be high or low according to your style or intent on the day. Leaving the learners to solve the problem for themselves is often a very dynamic idea.

Here is the next step for a chaos practice: introduce a pink ball, the Pink Ball of Pressure. Any mistakes made with the Pink Ball of Pressure incur a penalty of some kind (points, physical exercises, etc.) that accrue during the session. This reinforces the idea of watching the ball closely while doing all of the other activities: the other non-pink balls are being caught or passed more or less automatically. Plus, the Pink Ball replicates that 'oh my goodness, it's coming to me' moment.

I don't claim to have invented any of this (except the Pink Ball of Pressure) but I do know that it works and that it is fun. I would gladly hear of any similar ideas, and criticisms.

THE CURIOUS CASE OF PEER OBSERVATION

Jonny Nelmes | *Teacher of Classics, Eton College*

'Peer observation' – a collaborative exercise aimed at developing practice and stimulating reflective dialogue between colleagues (O'Leary, 2016) – is widely acknowledged to be an effective means both of improving individually and of fostering a culture of mutual support and endeavour. Therefore, this raises the question: why don't we do it more?

We may suggest several (good) reasons. Schools are busy places, and any professional development activity needs to be both accepted as valuable (Hargreaves & Fullan 2012) and facilitated appropriately (O'Leary 2020). Association of observation with appraisal, probation, inspection etc. may engender fear of judgement (Gosling 2005), and mischaracterization by observers. Coe (2014) cites a high degree of unreliability in observation judgments. The prevalence of 'atypical' appraisal-lessons means that observations often do little to contribute to an authentic understanding of a teacher's strengths and weaknesses and Smith (2013) likens them to the new coat of paint on hospital walls before the Queen visits.

So why should we observe one another? Simply put, because it works; all teachers, to some extent or another, have learned how to teach from watching others (even if only as students) or being watched ourselves. Teachers identify observation of and by one's peers as, variously, a wellspring of fresh ideas, a spur to introspection, and a source of *esprit de corps*. Evidence suggests that it is even more effective than 'external-trainer' INSET (Bell & Mladenovic 2007). This is perhaps unsurprising, insofar as our peers can be observed modelling pedagogy rather than simply discussing it, and are available to provide important follow-up conversations about the application and adaptation of approaches.

THE PREVALENCE OF 'ATYPICAL' APPRAISAL-LESSONS MEANS THAT OBSERVATIONS OFTEN DO LITTLE TO CONTRIBUTE TO AN AUTHENTIC UNDERSTANDING OF A TEACHER'S STRENGTHS AND WEAKNESSES AND SMITH (2013) LIKENS THEM TO THE NEW COAT OF PAINT ON HOSPITAL WALLS BEFORE THE QUEEN VISITS.

But when, where, and how does it work best? Peel (2005) noted that observation of teaching alone is not sufficient to enhance teacher performance in the classroom, without well-structured opportunities for reflection and follow-up discussion (cf. McMahon 2007). High-quality relationships between peers are also paramount to encouraging authentic engagement, because a willingness to take risks and discuss openly requires a high level of trust. In practice, then, peer observation exercises work best when needed, and when teachers have time to engage and enjoy the experience (so not in the first frantic weeks of a Summer Term). It works best in environments where there is a pre-existing ethos of community and collegiality, a culture of excellence and endeavour, and useful links with the wider educational community (in other words: at a school like Eton).

How is a less straightforward question to answer, and I shall attempt to do so by offering some brief examples from my own experience, buttressed by a little of the research, by means of advice (more thorough discussions of peer-observation models can be found in O'Leary 2020, p160f.). Common to all examples is proactive and specific discussion about teaching, rather than reactive and holistic evaluation of the teacher. Whilst effective peer-observation needs systematic thinking and discussion, it can be procedurally light-touch: there are no official criteria to meet, proformas to fill, or boxes to check!

Find a Focus

Identifying a 'focus question' before the observation positions the observed teacher's learning at the heart of the process, and narrows the observer's focus of attention such that it is the teacher's interests which emerge from the data collected (Grimm et al. 2014). Colleagues might be grouped from the outset by areas of expressed interest, either into pairs for mutual observation, or a 'teaching triangle' around a core area of focus. In a previous school I coordinated one observation week along these lines with a simple Microsoft Form, and another with a variation aimed more specifically at the observer: each participant was asked to identify one thing they'd like to see/try, and another that they'd be happy modelling; all that remained was to match up the two.

Alternatively, interested staff could take place in a 'learning walk': after consultation on an area of focus (eg. formative assessment, classroom layout), a time and series of locations to visit is published; the group then reconvene soon afterwards to discuss what they have seen (ideally along with the teachers who left their doors open).

Pioneered in Japan, 'lesson study' (*kenyuu jugyou*, for those wondering) involves two or more teachers working collaboratively to plan, teach and observe a 'research lesson'; one teacher delivers, while others observe; further discussion and observation can follow. In many respects, it is similar to buddy systems or 'teaching triangles', but with a shift in focus from teach-ers to teach-ing, and from individualistic to collective focus: they are 'our' lessons, not 'your' or 'my' lessons (Lewis & Hurd 2011). As a Head of Department I arranged several of these exercises with an early career teacher in my department – after an initial collaborative planning session we would either have one of us teach the lesson and the other observe, or team-teach the group together.

Embrace Technology

Technological advances and, more recently, the widespread use of video calls and recording during the COVID-19 pandemic have opened up a range of exciting new possibilities for peer observation as lessons can now be recorded and saved to a cloud for later viewing. Video can capture aspects of classroom life that a teacher might not notice mid-lesson and be used for 'stimulated recall' to produce reflection that is more meaningful. It may also produce a fuller and more reliable account of classroom events/interactions than the memory and narrative of a 'synchronous' observer. Where opportunities for observation once were limited by constraints of time and timetable, video observations are rewatchable/repurposable, quickly generating a repository of observable material that can be cut and edited to allow for more specific pedagogical focus. In March 2020 my previous department learned plenty from a series of Zoom observations (some asynchronous) for discussion of best 'remote' practice. More recently, I used Zoom to capture a Harkness lesson for a colleague which provided not only a view of the round-table discussion but also my screen as I took note of contributions and interactions across the group in real-time.

WHERE OPPORTUNITIES FOR OBSERVATION ONCE WERE LIMITED BY CONSTRAINTS OF TIME AND TIMETABLE, VIDEO OBSERVATIONS ARE REWATCHABLE/REPURPOSABLE, QUICKLY GENERATING A REPOSITORY OF OBSERVABLE MATERIAL THAT CAN BE CUT AND EDITED TO ALLOW FOR MORE SPECIFIC PEDAGOGICAL FOCUS.

Learn to Observe

Coe (2014) points out that 'untrained' observers may struggle to avoid judgement or opinion, misunderstand what is in fact 'good practice' or wrongly equate learning with 'proxies' such as classroom activity/atmosphere, student engagement/enjoyment, etc.. Whilst specific observation training such as CLASS certification may well improve an observer's skills, it would be wrong to suggest that no useful peer observation can be carried out among the uncertified! Grimm et al. (2014) recommend non-evaluative data collection techniques such as *scripting* (transcribing precise verbal interactions), *counting* (e.g. minutes on tasks, particular types of question, or students voluntarily responding to questions), and *tracking* (e.g. teacher movement) for later collaborative discussion and evaluation.

WHILST SPECIFIC OBSERVATION TRAINING SUCH AS CLASS CERTIFICATION MAY WELL IMPROVE AN OBSERVER'S SKILLS, IT WOULD BE WRONG TO SUGGEST THAT NO USEFUL PEER OBSERVATION CAN BE CARRIED OUT AMONG THE UNCERTIFIED!

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