Edited by **Alka Sehgal Cuthbert**
and **Alex Standish**

What Should Schools Teach?

Disciplines, subjects
and the pursuit of truth

Second edition

UCLPRESS

What Should Schools Teach?

KNOWLEDGE AND THE CURRICULUM

Series editors
Arthur Chapman, Cosette Crisan, Jennie Golding and Alex Standish,
UCL Institute of Education

The series promotes research, theorizing and critical discussion about what we teach in schools and in teacher education. It explores the nature of knowledge in contemporary societies, academic disciplines, school subjects and other fields of knowledge production, to foster inquiry into the relationships that can and should exist between knowledge-disciplines in schools and elsewhere.

Knowledge and the Curriculum aims to become a central hub for investigation into how disciplinarity, transdisciplinarity and interdisciplinarity can enable schools, teacher trainers and learners to address the challenges of the twenty-first century in knowledgeable and critically informed ways. The series explores questions about the powers of knowledge, relationships between the distribution of knowledge and knowledge resources in society, and matters of equity in access to justice and democratization. It is committed to the proposition that the answers to questions about knowledge require new thinking and innovation. These are open questions with answers that are not already known, and which are likely to entail significant social and institutional change to make the powers of knowledge and of knowing equally available to all.

The series emerged from the Subject Specialism Research Group at the UCL Institute of Education and a major international network of curriculum theorists (KOSS) centred around research groups in Karlstad (ROSE) and Helsinki (HuSoEd). It draws upon the expertise of all three research groups for its editors and advisory board.

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List of abbreviations

ABRSM	Associated Board of the Royal Schools of Music
A level	Advanced level examination taken at ages 17–18
AO	Assessment Objective – related to examination structure
BME	Black and minority ethnic
BTEC	Business and Technology Education Council (qualification)
CCEA	Council for Curriculum, Examinations and Assessment – public body of the Department of Education, based in Northern Ireland but also covers England and Wales
CLT	Communicative Language Teaching
CoRE	Commission on Religious Education
CSE	Certificate of Secondary Education – exam taken by the majority of pupils at the age of 16. Superseded by GCSE exams, which were introduced in 1988.
DCSF	Department for Children, Schools and Families (changed to Department for Education following 2010 General Election)
DfE	Department for Education, covers England (with devolved counterparts in Northern Ireland, Scotland and Wales)
EBacc	English Baccalaureate qualification – comprising of GCSEs in maths, English literature and language, science, history or geography and a foreign language
EEC	European Economic Community (which became the European Union in 1992)
GCSE	General Certificate in Secondary Education – a unitary exam system introduced to replace the dual exam system of O levels and CSEs. First exams were conducted in 1988.
GIS	Geographical Information System
HMI	Her Majesty's Inspectorate of Schools
ISM	Incorporated Society of Musicians
JCQ	Joint Council for Qualifications

KS	Key Stages refer to the organization of England's curriculum according to ages. In Northern Ireland the curriculum is similar except for the Foundation Stage that covers Years 1 and 2 (ages 4–6). Scotland and Wales have their own Curriculum for Excellence. There are four main Key Stages in the English curriculum:

KS 1 covers Years 1 and 2 (ages 5 to 7)

KS 2 covers Years 3 to 6 (ages 7 to 11)

KS 3 covers Years 7 to 9 (ages 11 to 14)

KS 4 covers Years 10 and 11 (ages 14 to 16)

LAMDA	London Academy of Music and Dramatic Art
LEA	Local Education Authority (with responsibility for schools and other amenities)
LGBTQ+	Lesbian, gay, bisexual, transgender and questioning/queer
MFL	Modern Foreign Languages
NC	National Curriculum, introduced in the United Kingdom in 1988
OCR	Oxford, Cambridge and the RSA (Royal Society for Arts, Manufactures and Commerce) – one of the main examination awarding bodies of the United Kingdom
Ofqual	Office of Qualifications and Examinations Regulation – non-ministerial body that regulates examinations, qualifications and assessments in England
Ofsted	Office for Standards in Education, Children's Services and Skills – England's official inspectorate of educational institutions
O level	Ordinary level exam – taken by selected pupils at the age of 16, superseded by GCSE exams, which were introduced in 1988
PGCE	Post-Graduate Certificate in Education
RE	Religious Education
SACRE	Standing Advisory Council on Religious Education
SCHP	Schools Council History Project
SLA	Second Language Acquisition
SRE	Sex and relationship education
STEM	Science, Technology, Engineering and Mathematics
WJEC	Welsh Joint Education Committee – a major examination awarding body in Wales, England and Northern Ireland

Notes on contributors

Alka Sehgal Cuthbert presented an argument for a progressive case for a liberal subject-based education for a PhD (Cantab.) in sociology and philosophy of education. She has worked in education for over 20 years as an English teacher at secondary level and lecturer in cultural studies in higher education. She currently works part-time as an English teacher for the educational charity Civitas. She writes on educational issues for academic and public audiences. Her research interests include social realist epistemology, aesthetics and the pedagogy of reading and English literature. Sehgal Cuthbert has contributed to the Standing Committee for the Education and Training of Teachers' publication, *The Role of the Teacher Today*, and has recently published articles on English in *The Curriculum Journal* and *English in Education*. She is a school governor and sits on Ofsted's advisory panel for the new inspection framework for English. She is a committee member of the Cambridge Symposium of Knowledge in Education and a member of the Philosophy of Education Society of Great Britain.

Alex Standish is Associate Professor of Geography Education at the UCL Institute of Education and a fellow of the Royal Geographical Society. He works in teacher training and supervises students at master's and doctoral level. He taught geography and other subjects in both primary and secondary schools in the south of England. He completed his doctoral degree in geography at Rutgers University, New Jersey, and then taught at Western Connecticut State University for six years. Standish has provided curriculum guidance for the Department for Education, the Department for International Trade, the London Mayor's office, examination boards and schools. He has single-authored two books including *Global Perspectives in the Geography Curriculum: Reviewing the moral case for geography*.

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Fredrik Berglund studied biomedical sciences in Sweden before moving to Scotland to do a PhD in biochemistry and cancer cell biology. He worked as a post-doctoral researcher in breast cancer research laboratories both at the University of Dundee and at the University of Toronto, Canada. He is currently a biology teacher at the East London Science School.

Christine Counsell is an independent education consultant. She previously held positions in comprehensive schools as Head of History, deputy head teacher, local authority adviser and senior lecturer at the University of Cambridge Faculty of Education where she ran the PGCE for history. From 2016 to 2018, she was Director of Education of the Inspiration Trust, a multi-academy trust in East Anglia. An editor of *Teaching History* since 1998, Counsell has published widely on curriculum, teaching and teacher education. She has frequently assisted, since 1994, in drafting England's National Curriculum for history. She has led training and consultancy, nationally and internationally, for governments, schools, NGOs and universities. From 2017 to 2019, she served on Ofsted's Curriculum Advisory Group.

Cosette Crisan is a mathematician and a mathematics educator. She taught pure mathematics at university level for 10 years, followed by teaching mathematics in secondary schools in London. She has been a part of the mathematics education programme at the UCL Institute of Education since 2010. Crisan's main research interest lies in the development of teachers' professional knowledge base for teaching, the professional development of specialist and non-specialist mathematics teachers and the incorporation of digital technologies in mathematics teaching.

Rania Hafez is Senior Lecturer in Education at the University of Greenwich where she leads the MA Education programme. She also co-chairs the London Learning and Skills Research Network (LLSRN) and is a fellow of the Muslim Institute. Previously Hafez was Director of Post Compulsory Education at the University of East London. In 2008 she founded 'Muslim Women in Education', a professional network for Muslim women educationalists and researchers. In addition to her academic work she is

a regular political and cultural commentator in broadcast media and in February 2020 was voted by colleagues and students as one of twelve Inspirational Muslim Women.

Shirley Lawes is an education researcher, consultant and university teacher, specializing in teacher education and modern foreign languages teaching and learning at the UCL Institute of Education. Her PhD research was a comparative study on the decline of educational theory and professional knowledge in initial teacher education. The recent focus of her research and curriculum development work has been on the use of short film in MFL teaching in collaboration with the British Film Institute. Lawes has published widely in both English and French on education policy, teacher education and the teaching of modern foreign languages and is currently writing a book on culture in language teaching. She is also a Chevalier dans l'Ordre des Palmes Académiques awarded by the French Ministry of Education for her contribution to the promotion of the French language and culture.

Tim Oates is Group Director of Assessment Research and Development at Cambridge Assessment, focusing on national and international research on assessment and measurement. In 2010 he published *Could Do Better*, which laid down the principles for the review of the National Curriculum in England. He was chair of the Expert Panel for Review of the National Curriculum in England. Emerging from this review, subsequent research on the quality and function of textbooks and other resources has been taken up around the world and discussed at two international summits on learning resources. He chairs various curriculum groups for the Department for Education in England. He has published widely on assessment and curriculum issues and routinely provides briefings and advice to the UK and other governments. He has worked with OECD on curriculum matters and is leading a new UNICET project on a curriculum framework for displaced children. He is a fellow of Churchill College Cambridge and in 2015 received a CBE for services to education.

Dido Powell is a painter and a teacher of art history, visual studies and art. She has taught for 35 years in higher education on art and design courses, as well as teaching A-level art history and A-level art. She also taught art at primary and secondary levels in Ghana. She has had many exhibitions in London and undertakes painting commissions. She takes groups on guided tours round galleries and believes that looking at paintings, sculpture and architecture is vital for a practising artist.

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Martin Robinson is an advocate for the great tradition of liberal arts education and author of *Trivium 21c, Curriculum: Athena versus the machine* and *Trivium in Practice.* He is a former drama teacher, working for over 20 years in East London state schools. He was a member of senior leadership teams and an advanced skills teacher. Now, he works closely with a variety of schools on curriculum design based on the trivium approach. A regular on the conference circuit both in the United Kingdom and internationally, Robinson's talks are challenging, entertaining and sure to get people talking and reflecting on their practice. He is also the founder and administrator of the Facebook group 'Drama teachers and those interested in drama education', one of the largest groups of its kind, which offers support, challenge and advice to drama educators around the world, and is the director of Trivium 21c Ltd. Education Consultancy.

Gareth Sturdy has been teaching physics since 1994, when he trained in the most deprived areas of Merseyside. His career has taken him to all types of schools including comprehensive, free, faith and independent. He has been Head of Physics in a leading grammar school and led the Mayor of London-backed Physics Factory project, which aims to reinvigorate the subject across London schools. Along the way, he has also found time to be a Fleet Street journalist and run his own public relations business. He continues to write regularly for the press on education and science.

Simon Toyne is Executive Director of Music of the David Ross Education Trust, where he is responsible for the development of music across over 30 state primary and secondary schools in the East Midlands, including leading the award-winning 'Singing Schools' programme and conducting the Chapel Choir of Malcolm Arnold Academy and the DRET Youth Choir. His work at DRET has included establishing a

common music curriculum, creating a network of partner organizations, developing a team of specialist music coaches and instigating a talent development programme. Toyne is renowned as a choral conductor, working as a director of the Eton Choral Courses and the Rodolfus Foundation Choral Courses, and leading workshops on conducting and singing around the world, having been Director of Tiffin Boys' Choir and Kingston Parish Church Choir for over 20 years. He is a member of the UK Government's expert panel for developing a model music curriculum and is the current president of the Music Teachers' Association.

Foreword

Tim Oates

While discussion of educational purpose is present in the ancient literature of both the East and the West, the universality of education for young people, which is characteristic of modern society, has occurred very recently in human history. We tend to forget just how recent a phenomenon it is. UNESCO figures show that it remains still an aspiration for one in five school-age children. In those nations that, two centuries ago, were at the forefront of universal and extended education, the focus and content of education remain heavily contested. And scores in the big transnational surveys across those nations are a mix of rising, flat and declining. Hard won improvements have gone into reverse in some nations, and equity remains a burning issue in almost all. Those nations that have recently attained near-universal participation now have their young people in schools, but while present on the premises, these pupils are not necessarily enjoying the benefits of either strong educational outcomes or educational improvement. Providing sufficient places and teachers is one thing. Providing a rich, effective curriculum is something more.

The stalling of educational improvement in many nations promotes hand-wringing press comment and tense political argument. The words 'crisis', 'failure' and 'shock' accompany vitriolic exchanges in nations as far apart as Scotland and Australia. In education we seemed to have achieved so much in such a short time – universal literacy in England attained during the upheavals of the Industrial Revolution – but then we have failed to consolidate our gains in curriculum content and process into a solid set of principles and understandings.

The simplicity of aims and purposes present in 'universal participation' and 'universal literacy' has been replaced by complexity: attention to curriculum processes as well as content; attention to pupil welfare as well as cognitive development; integrity of social learning alongside

the needs of individuals; equity as well as attainment; attending to the distinctions between intended curriculum, taught curriculum, learned curriculum and assessment curriculum.

Much of this complexity is entirely right and contributes usefully to curriculum theory and practice. Curriculum exists as a complex interaction of the actions of state, school and pupils. It exists in the formal specification of a National Curriculum as well as the exchanges between children and teachers in classrooms. Finding our way through this complexity to both describe what is happening and develop approaches to professional practice that improve equity and attainment is a challenge to theorists and practitioners alike.

Opportunities presented by educationalists seeking to understand and examine this complexity have on occasion been squandered when subsequent misrepresentation of their work has occurred. When in the 1960s and 1970s Lawrence Stenhouse argued cogently for curriculum to be seen as far more than merely a list of content, and the action of teachers being critical for curriculum enactment and improvement, he was not arguing that content specification was unnecessary or seeking to undermine the authority of the discipline knowledge that was codified by specifications. The idea that teachers are active creators of the enacted curriculum in specific school settings does not deny cultural transmission of established knowledge, understanding and skills.

The fractious debates over these matters seem to have wandered down roads that have proved to be spectacular dead ends, some of which, when a lull in the debate has given pause for thought, now seem absurd. The confusions have perhaps been created by a legitimate attempt to understand the complexity of curriculum, but both contemporary philosophy of science and mind do not look kindly on them. The strength of the contributions in this book is that they subject both the assumptions and content of these debates to intense critical scrutiny. But they go beyond scrutiny. They use critique of previous epistemological and ontological positions to formulate propositions for action to reinstate focus on disciplines and the importance of development and renewal of disciplines through education.

The most significant victim in the debates prior to this book was subject disciplines. There have been two severe attacks. The first claims knowledge to be of far lower status than educational process or other outcomes of education. The second claims that subjects are arbitrary.

On knowledge, the claims derive from three strands of argument within post-modernist theory. The first strand is that knowledge is value-laden in its production and represents and recreates specific

power relations. While the production and reproduction of knowledge is human endeavour and must by necessity include values, the decision to analyse a virus rather than an insect or a film of course includes a value-based decision. But within educational discourse this position has decayed time and time again into an attack on the power and authority of the knowledge created by this endeavour, arguing that acquisition of discipline knowledge should not be one of the principal aims of education.

This fails to recognize that both philosophy of science and those within subject disciplines have moved well beyond the relativism and solipsism – even nihilism – that this position represents. Subject disciplines have stubbornly ignored the brake on the appreciation of the value of knowledge posed by some educational theorists and have continued to create new knowledge of human disease, animal behaviour, information storage, optical and radio telescopy, minimalist music and ceramics. Alongside this refusal of subject discipline communities to stop working and acting, contemporary philosophy of science both explains why certain claims about the social and natural world have more explanatory, causal and predictive power than others and, rather than using the fact that knowledge evolves over time as proof of its arbitrariness, goes well beyond this stalling point to explain *why* knowledge changes over time. This reasserts the power of human knowledge, the importance of discipline enquiry (its techniques, language and practices) and the need to be discriminating – not all knowledge is equal. Some needs to be lodged as 'interesting but outmoded', some to be rejected as 'false and misleading' and, of course, some accepted as a canon of 'old but essential' – whether that be in geography, cosmology or literature. Of course, the debased philosophical position that emerges from post-modernist thought has more recently been joined by a new set of voices. While not sharing the philosophical tenets of post-modernist thinkers, these voices claim that the sheer bulk of human knowledge means that the acquisition of specific knowledge is inhibiting and unnecessary and that the skills of finding knowledge are more important than the content of knowledge itself.

Just as the bandwagon of 'all knowledge is arbitrary' was beginning to run out of energy, these interests gathered behind it and gave it a new push. The arguments against this new erosion of the authority of knowledge derive not only from epistemology but have been made by some in relation to cognitive science: what individuals recall and have immediately available for thought and action is critical to their constitution of identity. Their argument is that without retention of key concepts and core knowledge in long-term memory, the limits of working

memory mean that high-order critical thinking cannot occur. But despite the compelling nature of the theoretically driven and empirically driven refutation of this 'all you need is the knowledge of how to access knowledge' proposition, further confusion was caused regarding the authority of knowledge. Put simply, the older and newer arguments confuse different forms of authority:

Authority – power associated with the production of knowledge
Authority – of the school in 'legally holding children'
Authority – of the teacher
Authority – of the state in determining the curriculum
Authority – of instruments of curriculum control
Authority – of knowledge

This book untangles these confusions. And rightly so. The rhetoric of access to powerful knowledge was very much located in the Left during the 1930s and 1940s. The social liberation and equity that artists, political activists and politicians sought was not associated with dismissing the powerful knowledge that had been derived by elites, but by obtaining access to it for all. Now, the same commitment to access to powerful knowledge through schooling is more associated with the Right. What this book provides is a valuable focus on the authority of discipline knowledge, and it confronts the difficulty that knowledge stands as bodies of 'discipline knowledge' independent of the actions of individuals yet needs to be acquired meticulously by new generations of individuals, and is contributed to by individual and social efforts.

The second victim of the reductivism of post-modernist analysis of social and historical location of knowledge and its notional 'arbitrariness' was the existence of subjects and disciplines. The discrimination between disciplines was seen as historically mutable, the boundaries as vague (citing maths in physics, biochemistry, and the historical changes from 'natural philosophy' to three major sciences) and the sense of the school curriculum as a product of state control. Subject disciplines were out, cross-curriculum specification and rich, multi-disciplinary 'learning experiences' were in. But in this position we again can identify confusions. The fact that insights can be gained from the application of physics in medicine, the application of psychology in economics, or that digital rendering can give a visual representation of the equations of black holes does not detract from the important particularity of the concepts, techniques and practices that differentiate specific disciplines.

The fractious debates about 'subjects' become most intense around 'student motivation' and 'the purpose of education'. Statements such as 'we should be teaching pupils to be prepared for the real world as it exists today…' and '…motivating real contexts as a basis for learning…' de-prioritize something very important: that 'disciplines' have provided concepts and techniques that reveal deep structures that are not particularly evident or obvious in real experience. Knowledge of the existence of the electron was neither obvious nor readily gained from 'day to day real life experience', nor the difference between bacteria and viruses nor the idea of 'unconscious bias'. While it is clear that careful variation of context is essential for establishing and maintaining learner engagement, it is only a part of the complex jigsaw of curriculum theory and practice. To reify 'contexts' over the specifics of disciplines is to walk a very narrow path indeed, and runs an extreme risk of neglecting the human agency that comes from disciplinary understanding: tightly linked networks of explanatory concepts and defined practices (of production, analysis, discourse, enquiry).

This book provides a tonic to reductivist analysis and oppositional debate. It preserves the complexity of what we mean by 'curriculum' yet remains clear about the aims of education in creating both attainment and equity. It is traditional, in that it asserts the importance of antecedent discipline thought and enquiry, yet modern, in that it acknowledges the importance of the conditions for creating new knowledge and the criteria we should use for subjecting that knowledge to scrutiny. Opinion-formers, educationalists, politicians, teachers and their managers, pupils and parents all need reference points and principles, for these are a guide to thought and action. This is exactly what this book provides.

Cambridge, May 2020

Introduction to the second edition

Alka Sehgal Cuthbert and Alex Standish

> *At the very heart of education sits the vast accumulated wealth of human knowledge and what we choose to impart to the next generation: the curriculum.*
>
> (Spielman, 2017)

We produced the first edition of this book in 2017 because we were concerned about the paucity of attention to curriculum thinking in general and a lack of clarity about what a subject is. We highlighted how an over-regulated system was placing too much emphasis on testing and data management and not enough on the intrinsic value of learning knowledge (Biesta, 2010). As we noted at the time, this development was related to confusion about the purpose of the curriculum and the nature and value of disciplinary knowledge. In the UK, as in other English-speaking countries, 'knowledge was dethroned in society and displaced in curriculum' (Wheelahan, 2010: 87).

In the introduction to the first edition we suggested that:

> Many young people entering the teaching profession are unclear about the role of disciplines and knowledge in the school curriculum and the education of children, and some do not understand how academic knowledge is different from other types of knowledge, or what distinguishes knowledge from opinion. For those already working in the profession, including experienced teachers and representatives of examination boards, subjects have come to be viewed less in terms of epistemic principles and value, and more as a means to another end such as developing marketable skills, facilitating well-being, promoting diversity or addressing global issues. (Standish and Sehgal Cuthbert, 2017: xvii)

This was in spite of the 2013 reform of the National Curriculum for England and Wales, which aimed to re-focus the curriculum on subject knowledge (DfE, 2010). While the new curriculum does include significant and valuable academic knowledge it was widely criticized by schools and educationalists, if not dismissed, as only reflecting the perspective of the UK Coalition government (Conservative Party and Liberal Democrat Party) who led the reform. In essence, the government had not won schools over to their curriculum. And, with the Department for Education announcing that the new curriculum does not apply to free schools and academies, it is no longer a *national* curriculum. What we felt was missing from the reform was a clear rationale for why this knowledge is important for children to learn in the twenty-first century and what different forms knowledge takes.

However, the fault for the paucity of curriculum thinking, and confusion between pedagogy and curriculum, in teacher education lies not just with schools but also with the field of curriculum theory. Zongyi Deng (2018a) discusses the uncoupling of curriculum theory from the social realities of schools as complex social institutions, and from realist epistemologies, contributing to what he calls the re-conceptualization of curriculum theory. He observes that since the 'post-modern/post-structural turn', questions about which knowledge schools should teach and how it is implemented in schools have been superseded by questions about 'whose knowledge' and what 'agenda' or 'power' they have in society, making curriculum studies closer to 'cultural studies' in kind (2018a: 692). Under these intellectual conditions, theory (in the non-physical sciences) loses its power to accurately portray social reality, never mind explaining or predicting it. Deng is critical of the expansion of topics and commitments to 'pushing theoretical and methodological boundaries' (2018a: 692), which has obscured the core of curriculum studies, which is *what* schools teach in complex social institutions and why this knowledge is important for children to study. It is to these matters that we aim our attention in this book.

Before we do, there are two very significant and potentially contradictory developments that have become more apparent since the publication of the first edition and are impacting curriculum thinking in schools: the knowledge turn and instrumental approaches to the curriculum.

The knowledge turn

There can be little doubt that the educational landscape in Britain has changed dramatically over the past decade, and one of the main features

of contemporary educational discourse in policy and professional circles is what we call 'the turn to knowledge'. This turn can be traced back to the late 2000s and increasing awareness of politicization in the curriculum (Whelan, 2007) and the publication of Michael Young's (2008) *Bringing Knowledge Back In* followed by *The Importance of Teaching*: *The schools white paper* (DfE, 2010). The official turn to knowledge became evident when Michael Gove, as Secretary of State for Education, introduced a much-heralded back-to-basics version of the National Curriculum in 2013.

The 'knowledge turn' has been accompanied by the emergence of the school curriculum as a more clearly delineated discursive object. In the past, the curriculum tended to be assumed: a natural aggregate of whatever subjects that schools were teaching. Today, due to developments external and internal to education, the curriculum is argued to be of central importance for schools if they are '*to define and own their own purposes*' (Young in Young et al., 2014: 45, our emphasis).

More recently, the turn to knowledge is reflected in the 2019 concepts, '*sufficient knowledge and skills for future learning and employment*' (Ofsted, 2019b: 10, our emphasis). In preparation for 2019 inspection framework, Ofsted undertook initial curriculum research in which they found one-third of the schools they visited to be 'knowledge-led', half as 'knowledge-engaged' and the remainder as 'skills-led' (Ofsted, 2019a: 6), although there is little clarity about what these characterizations mean in practice. Amanda Spielman, Chief Inspector of Ofsted, appears to be on a mission to refocus schools on curriculum as the central matter of education. She has criticized schools for 'teaching to the test' and narrowing the curricular experience of children. However, conversations with teachers revealed a distinct 'lack of clarity around the language of the curriculum' and 'little debate or reflection about it' (Spielman, 2017). It can be argued that since the introduction of the National Curriculum in 1991 the curriculum has not been a matter of serious attention, meaning we have a generation of teachers who have been trained at universities and schools without being asked to think deeply about what is being taught and why (although below we will explore other reasons for its fall from grace).

Since the publication of the 2019 inspection framework teachers and senior managers have been busy revising curricula, writing rationales and composing policy documents on the curriculum. In publications such as the *Times Education Supplement*, *Impact*, *Schools Week* and *Teach Secondary* suddenly everybody wants to write about the curriculum. References to the works of Michael Young, Gert Biesta, Christine Council

and Dylan Wiliam are in abundance. And there have emerged a number of networks, organizations and academy chains that advocate a knowledge-rich approach to teaching, many of which predate the 'Ofsted turn'. These include the Midland Knowledge Schools Hub, Inspiration Trust, Harris Academy, Ark Academy, Michaela School and Parents and Teachers for Excellence.

In part, the knowledge turn is an attempt to re-balance what was seen as the dominance of social constructivist ideas of knowledge and teaching in schools; certainly the 2019 Ofsted inspection framework lacks the language of pupil outcomes present in the 2015 framework and speaks instead of the quality of education. 'Learner outcomes' and 'skills' have come to characterize an over-generalized reading of social constructivism that has been influential in teacher education. For some of its critics, social constructivism is read as a proxy for wider cultural and political decline.

The knowledge turn has been contested by sections of academia and most education unions. Despite the ferocity of the debate, both sides of the 'traditional' versus 'progressive' divide share an important assumption: that the aim of education is to improve social mobility, or its more recent reincarnation, social justice. In 2019 the UK Labour Party launched a new social justice initiative to challenge the government's approach to social mobility. Joint General-Secretary of the National Education Union (NEU), Mary Bousted, expressed her support for the new initiative: 'We welcome Labour's commitment to turning around the growing problem of poverty and inequality that was never properly addressed by this government's flawed concept of social mobility' (*Education Executive,* 2019). In contrast to the 2013 National Curriculum's knowledge-based approach, Bousted advocates a skills-led curriculum to prepare young people for their future (Bousted, 2018). From the other side of the political divide, the foreword to a collection of essays written to accompany a lecture by E.D. Hirsch introduces the case for knowledge in the curriculum also in the language of social justice, cultural capital and addressing inequalities (Simons and Porter, 2015). In *What Should Schools Teach?* we want to re-direct the discussion away from over-emphasizing the power of education to effect structural change in society and towards the qualities of knowledge itself and to educational aims.

While the knowledge turn (both in schools and in officialdom) is a welcome development as it provides an opportunity for developing the curriculum thinking and language that has been all too absent from many schools in recent years, it is imperative that schools see knowledge as having intrinsic educational value. We recognize that policy discussions

are more likely to view 'core-knowledge' in relation to political objectives (social justice, social mobility or employability). However, there is a real risk that the turn to knowledge will become the latest form of educational instrumentalism: educators need to be able to provide credible reasons with which to counter the pressures of instrumentalism. With this book we are making a case for schools, universities and education advisers to be given their own professional space to re-build the curriculum on educational terms. In order for this to happen, we need to start with a stronger theory of knowledge and for this to gain wider acceptance among the profession and the public.

Instrumental approaches to the curriculum

Instrumentalism in education comes in many forms. It can be economic, as when Prime Minister James Callaghan called upon universities to better meet the needs of business in his (in)famous Ruskin speech in 1976 (Callaghan, 1976). Or it can be political: for example, the desire for schools to produce more politically engaged young citizens, which was one reason for the introduction of compulsory citizenship lessons in England and Wales. And, as indicated above, a more recent form of instrumentalization is in the form of social mobility or social and environmental justice. Any form of educational instrumentalism poses problems for teachers.

Without a strong sense of being professionally autonomous agents, teachers remain in a defensive position vis-à-vis a range of external pressures, be they demands from politicians or other interested parties. While it is true that the past decade has seen wider recognition of the need for educational policy to take greater account of curriculum and knowledge, it is also true that a theory of knowledge is weak, even among its advocates. In 2018, for example, the government announced funding for schools judged to be knowledge-led, as long as they evinced a commitment to 'teacher-led instruction and whole class teaching' (Staufenberg, 2018).

This prescription on teachers' methods (either teacher-led or pupil-led) is unnecessary and constraining for teachers and schools. In truth, as becomes clear in reading the chapters on specific subjects, key epistemological features of a discipline point to the suitability of some methods over other possible choices. These are not generalizable across the curriculum or classrooms: teachers need a high level of professional autonomy with which to select from a range of subject-specific pedagogic approaches in the context of the pupils in their

class. Teachers need to know about both epistemology and pedagogy, and more.

It seems that while there has been a turn to knowledge at the level of official educational and inspection policy (in intention if not fully in practice), it co-exists within a continuing instrumentalized concept of educational aims at a general level. The charity Parents and Teachers for Excellence has studiously maintained a list of suggestions on and requests for what schools should teach, as reported in the media. For the 2019 calendar year there were 114 proposals, including teaching mental health, how to spot fake news, knife crime, reducing plastics use, food (banning junk food) and farming, critically examining porn, teaching sleeping skills, gardening and how to conduct oral sex (Parents and Teachers for Excellence, 2019). Another novel development in 2019 saw pupils across numerous countries 'on strike' from school over the political issue of climate change. One of the demands of the UK Student Climate Network was for climate change to have more prominence in the curriculum (it is already taught across several National Curriculum subjects), suggesting that some children have internalized the idea that the curriculum is for fixing social and environmental problems (UK Student Climate Network, 2020).

Treating the curriculum as a 'tool' to solve social, environmental, health and economic problems can only serve to undermine commitment to a concept of education as a public good in its own right and, by extension, weakens the case for teacher autonomy. Any form of instru- mentalism, no matter how ethically desirable, is unlikely to solve the external problem (e.g. education and teachers cannot improve social levels of poverty for the simple reason that education does not directly produce surplus economic value). It can, however, affect the *distribution* of society's material and cultural goods, which is what calls for social mobility or social justice amount to. But when extrinsic goals are valued more than the intellectual and aesthetic heart of education, they can have distinctly anti-intellectual and anti-educational effects. While education does have several worthy extrinsic aims, such as gainful employment, socialization and learning about the responsibilities of citizenship, their success is contingent upon acquisition of the 'generative principles of disciplinary knowledge' (Wheelahan, 2010: 107), as well as the capacity for 'objectivity and critical reasoning' (Rata, 2012: 80), which enable young people to transcend their particular context and contribute to society as culturally and civically engaged citizens.

In fact, there are good reasons to question social mobility as an automatically laudable aim. Head teacher Michael Merrick raises the

objection that it tends to encourage excessive individualistic competition (Merrick, 2018). For working-class pupils, the emphasis on life destinations often equates success by the distance, both geographical and cultural, that a pupil achieves from their home background. The price of success as formulated in terms of social mobility, he suggests, may be too high in terms of local solidarity. At the same time, Merrick is rightly wary of politicians and cultural elites whose conclusion is to advocate different curricula according to dispositions or interests imputed to pupils: which has often meant vocational for the working class and academic for the rest. From an internal view, educational relationships, like those of civic life, do not have to be understood solely in terms of the asymmetry and conflict of politics: they can be sites for cultivating collaboration and mutual tolerance based on a shared educational endeavour.

There are other problems with the belief that there is a close causal link between education and social mobility, not least the fact that research conducted on longitudinal surveys suggest that social mobility has declined over the same period that educational provision has expanded. For example, Blanden et al. (2002: 18) write, 'The economic status of the 1970 cohort is much more strongly connected to parental economic status than the 1958 cohort.' While the idea of social mobility might make sense at an individual level, as a generalizable social fact the idea that social mobility can be increased via educational routes does not.

When people are seriously proposing that gardening, sleeping and pornography should be on the school curriculum, it is clear that there is much confusion about what schools are for and why some knowledge is more valuable for children to learn than other knowledge. Leesa Wheelahan (2010: 88) gives a detailed account of how and why 'knowledge was dethroned in society and displaced in schools', finding that instrumental approaches to knowledge and education have 'weakened insulation between the field of knowledge production and society more broadly'. One example she provides is the erosion of the boundary between education and training for employment through a discourse that portrays education as a personal investment in the development of 'transferable skills' and competencies for future employability. A second instance is the blurring of the boundary between the domains of politics and science. Wheelahan (2010: 95) notes the passing of a tradition whereby 'Researchers undertook value-neutral research which could be counted on to be "true", and politicians decided how it would be used'. Of course, research does involve a commitment to the value of truth, which necessitates following established methods and procedures to minimize bias. In contrast, today many academics no

longer attempt to draw a line between education/research and politics, frequently importing preferred political campaigns into the university (Fish, 2007). Conversely, politicians often defer to the insights of 'experts' rather than the strength of moral claims for their arguments. A consequence of declining belief in the non-partisan pursuit of science has been the erosion of the value and special authority of research and theoretical knowledge, because they are viewed as reducible to self-interest (Muller, 2000: 148).

To be clear, we are proposing that an educationally defensible curriculum needs to be seen as having its own purpose – induction into systems of worthwhile knowledge – rather than being seen as means for addressing social, economic and environmental issues (Biesta, 2005, 2010; Pring, 2013). We say more about the unique purpose of the curriculum below and in Chapter 2.

Our approach to education and the curriculum

The politicization of education, including the curriculum, often means that positions on knowledge are conflated with particular political positions, or broader cultural outlooks. In an attempt to prise some discursive space in which to develop a case for knowledge, Young and Muller (2010) distinguish between three educational scenarios: future 1, future 2 and future 3. The first is associated with a conservative culture and politics, the second is a description of social constructivism in the service of progressive political change and the third is an emergent model of knowledge where its full powers can be actualized.

In advocating for the special place of knowledge and the idea of canonicity in the curriculum we appreciate the problems this raises, not least in the context of current critiques of knowledge from sections of academia calling for educational decolonization (see Chapter 1 and the chapters on English literature, Geography and History). However, we hold that the idea of the canon is constructive so long as it is rooted in epistemological and aesthetic criteria. It is crucial for those who support a knowledge-based curriculum, because without it, it is hard to see where the criteria for selecting curriculum content, and concomitant pedagogic principles, will come from. In short, if future 3 knowledge is emergent, then it must emerge from *something*.

Henceforth, the approach taken in this book is grounded in a tradition of liberal education that views education as an end rather than a necessity and seeks to nurture free-thinking human beings and citizens

(Levine, 2007). Drawing on the work of Arthur Morgan and the University of Chicago tradition, Donald Levine (2007: 179) identifies the following aims of liberal education: well-rounded personal growth; critical, reflexive thinking; adherence to high intellectual standards; ability to grasp relatedness of different fields of knowledge; and heightened levels of individuality (achieved through collective study of curricular knowledge). Levine (2007: 181) proceeds to identify four essential elements that can form the basis of a revitalized liberal education:

a) *The character of the learner* – preparing them for their whole life, including physical health; work; appreciation of social, religious, economic and aesthetic values; knowledge of history, literature and science; and a life purpose and philosophy.

b) *The universe of things to be known* – a broad curriculum that introduces diverse fields of knowledge and knowing things for themselves.

c) *The common heritage of humanity* – induction into a corpus of learning common to all in a particular cultural tradition, including great works in other civilizations.

d) *Disciplines of knowing and creating* – embracing all fundamental skills provides the basis for the development of particular skills.

We also concur with Levine's generative principle for curriculum construction: the assumption that scientific, moral and aesthetic domains of knowledge involve 'irreducibly distinct intellectual powers' (2007: 98). In the first edition we proposed that the school curriculum should challenge pupils to consider moral (what is right), aesthetic (what is beauty) and epistemological (what is true) questions. This principle informs the organization of a broad curriculum in arts, humanities, natural sciences and mathematics, which forms the basis for the organization of the subject chapters in this text. Another reason that we are drawn to the liberal education tradition is that it is often conceived as a general education for all. This stands in contrast to the current situation in England where unequal educational opportunities reflect differences in class, affluence and geographical location. While we also acknowledge the place and value of vocational knowledge in the curriculum, here we are making a case that academic knowledge is important for all young people, at least up until they make a choice about a career path or further study.

We should clarify that in our view there is no necessary connection between liberal education and any specific form of political liberalism. Liberal education is, however, compatible with a concept of citizenship

broader than participation in economic or political life alone. This may be a good reason why an individual does neither yet remains a citizen. The scope of our adoption of the term 'liberal education' is limited to questions of knowledge, intellectual and imaginative development that *indirectly* contribute to renewing wider cultural and political life.

We are not arguing that there was a golden age when education was valued purely for its own sake, free from any extrinsic appendages. Durkheim (1979) made the point that schools could only make society's moral values manifest (and thus strengthen social cohesion), *if they exist in society first*. Likewise, schools can only make the intrinsic value of knowledge manifest in education to the extent that society at large values knowledge and its production.

Our concern is that the widespread acceptance of the instrumental-ization of education suggests that this is not the case, despite sincere attempts to reintroduce knowledge into education. For us, this suggests a logically prior problem of a lack of value consensus in society at large. More specifically, and of great importance for education, is the diminished public status of truth (in a period dubbed 'post-truth') and the epistemo-logical and ethical commitment entailed in its pursuit. The weakening adherence to truth as a standard has had deleterious consequences at a societal level but poses a serious problem for education, where truth is the basis for the authority of scholarship, at all levels (Williams, 2002). Within academia, epistemology and curriculum theory seem to have been adversely affected by the declining commitment to truth. Johan Muller, for example, writes:

> social constructivism as a broad anti-epistemology movement has taken a perfectly reasonable set of theses about the social constitu-tion of knowledge and has radicalised it into a set of sceptical claims about the constructedness of reality itself, which in reality becomes merely an artefact of our knowledge about it. (2000: 2)

When truth is no longer a stable epistemological standard against which to verify any claim, claims are made and accepted for more contingent and instrumental reasons, and public understanding of the difference between a knowledge claim and an opinion can become blurred. We draw on *social realism* as an approach to knowledge in the curriculum because it speaks to the epistemological requirements of knowledge and the sociological conditions in which it is produced, developed and taught. Social realism is a broad umbrella term under which its contemporary theorists, which include Michal Young, Rob Moore, Johan Muller, Karl

Maton, Graham McPhail, Elizabeth Rata and Leesa Wheelahan, begin from the premise that the reality of knowledge rests in its sociality. Its theoretical roots are in the works of Émile Durkheim, Ernst Cassirer and Basil Bernstein. Chapter 1 provides a detailed explanatory account of the key concepts in social realism and aesthetics.

While we take a liberal approach to educational aims and a social realist approach to knowledge, we also draw on the European continental traditions of Bildung and subject didactics. Bildung refers to 'the formation of the full individual … through linking the self to the world' (Deng, 2018b: 374), while subject didactics is a pedagogical approach that examines the pedagogical relationships between the teacher, the student and the subject matter (Hopman, 2007). These are explored in Chapter 2, as well as their correspondence with Anglo-American liberal education and Gert Biesta's (2010) notion of 'subjectification', or the formation of individual agency. The other reason we favour subject didactics is that in linking teacher and pupils in learning curriculum knowledge it helps the teacher to move past the ideologically informed polarization between 'traditional' (knowledge centred) and 'progressive' (child centred) that has plagued Anglo-American education for decades.

For similar reasons we draw on Hannah Arendt's (2006) exposition of education as an 'intergenerational conversation' about the world. Here, teachers sit at the interface between the past (subject knowledge) and the future (the pupils), mediating a conversation between the old and the new. The fact that teachers, simply by virtue of being adults, know more than pupils is often lost in the current cultural context where there is a trend to replace the old and outdated with the new and allegedly highly relevant. Moore (2009) refers to this as the tombstone version of progress. All past gains in culture and knowledge are delegitimized – done and dusted and consigned to a hermetically sealed past, and a search for new sources of epistemological and moral authority gathers pace. Not only does this fly in the face of how disciplinary knowledge is produced but it also has unfortunate consequences within professional and school practice. It leaves both teachers and pupils bereft of intellectual resources from which they can construe standards of their own from which to develop their judgement-making capacities through the collective human practice that is education.

We hope we have provided the reader with a sense of the scope of what is at stake in the knowledge turn. It is about *more* than improving ranking positions based on qualification outcomes and *less* than wholesale political or economic improvement. It is about valuing education and

knowledge for their own sake. Deng suggests that curriculum theory needs to start with the practical, and we agree with his aim of countering the effects of post-modern, re-conceptualizing theories. Nonetheless, we wish to uphold a central tenet of social realist theory, which is that at the heart of *the curriculum* is knowledge: or rather it *should* be knowledge. Furthermore, there is a fundamental differentiation to be made, and observed, between everyday and specialized or theoretical knowledge, although they exist in a relationship (this is discussed in Chapter 1).

There are some important caveats: we do not think that the curriculum is *all* that schools provide, nor should it be. Nor do we think that *only* specialized knowledge has access to truth. Finally, we are certainly *not* saying that a commitment to social realist epistemology means that teachers need to follow prescribed methods of teaching or scripted lessons. One aim of the book is to prompt deeper thinking through which teachers can draw their own conclusions in relation to their own practice and professional identity as educators.

The book is organized in three parts: the first part locates liberal education in a historical and philosophical context and provides an explanatory account of disciplinary knowledge based on social realist epistemology and aesthetics. We also draw attention to the development of language from mythic to scientific modes in order to help address the problem of an underspecified theory of language that besets much contemporary educational discourse. The second part considers how disciplines are related to school subjects and to the wider aims of schooling, including the formation of character. The final part consists of chapters on different school subjects written by teacher educators or teachers of the subject at secondary level. Together they represent the main disciplinary fields: arts, humanities, natural sciences and mathematics. Most provide a brief historical account, a discussion of the subject's epistemic structure and implications for teaching and, as such, provide an illustration of pedagogic principles that are subject sensitive rather than generic. We are not claiming that these chapters present the only or even the best account of disciplinary knowledge in the curriculum. What we are asserting is each chapter illustrates the kind of curriculum thinking that should be going on in schools and in relation to education policy-making. While these chapters could be read as discrete units, they will be richer resources if read with Chapters 1 and 2, although the reader may wish to read these after their preferred subject-specific chapter.

Our focus on the secondary school curriculum does not in any way detract from the importance of primary schooling, where children are first introduced to disciplinary and theoretical ways of thinking.

The secondary curriculum is simply our focus for this study because it is the site where disciplinary knowledge becomes more specialized and abstract. We would welcome further study into the primary school curriculum and how pupils begin to make the transition from everyday to theoretical constructs.

The aim of this book is to contribute to a more robust rationale for and understanding of what schools should teach – *the curriculum*. This is not to dismiss the significance of pedagogy, how children learn and the personal knowledge and experiences they bring to the classroom. Rather, to become a successful teacher depends upon understanding the respective roles of each. And the curriculum – *what to teach (and why)* – is logically prior to how to teach it. There is no more important *practical* question in education. We hope that the chapters in this book will assist schools and teachers in their discussion, thought and debate about what a curriculum is for, how knowledge is selected, organized and structured, and why.

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1
Disciplinary knowledge and its role in the school curriculum

Alka Sehgal Cuthbert

The objective of education is to learn to love what is beautiful.
(Plato, *The Republic*)

Introduction

Philosophy of education, sociology of education and epistemology have a minimal presence, if at all, in the professional formation and development of most teachers in Britain. This situation is not new, but the problem has been exacerbated by the educational reforms of the late 1980s and early 1990s, which have contributed to the problems discussed in the introduction. Sadly, many teachers think that theoretical knowledge would be of no help at all in the classroom. We beg to differ. The foundational subjects of education and some understanding of epistemology are central to the work of teachers. Knowledge is the *primary* good (but not the only one) with which teachers deal. During the course of our professional lives as educators, we are likely to find our work substantively affected by policies made by powerful political and professional actors, and *their* understanding of knowledge, or lack thereof.

The premise of this book, and this chapter specifically, is that some understanding of social realist epistemology, theory of language, and aesthetics can help teachers construct robust curricula for themselves. Without a more philosophically informed understanding of the broader category of education it is harder to argue for greater professional autonomy in the face of clamorous demands that we should be meeting a hundred and one goals, some of which may be valid and important but secondary to our intrinsic purpose, which is to educate.

To begin with the quotation that opens this chapter: love and beauty are not words usually associated with education, even less with knowledge, and less still with *disciplinary knowledge*. Contemporary meanings of the words 'love' and 'beauty' are closely associated with private, individual preferences. Consequently, they can appear to be inadequate criteria with which to define the objectives of either education or knowledge. Yet the quotation from Plato touches on an important point: that prior to deciding what the objectives of education, or anything else for that matter, should be, we have already judged certain values to be more important than others. Plato's words, in relation to education, indicate that love and beauty are prioritized. For Plato, writing within a metaphysical cosmology, love and beauty are assumed as intrinsically good and intimately tied to the value of *truth*, because they are properties of a divine power. The overarching aim of education is to bring pupils closer to realizing these values in the conduct of their lives; the most able of students, after successful study in dialectics, would go on to take on the role of wise advisers to the polis. In *The Republic*, Plato distinguishes liberal education from training:

> For we are not speaking of education in this narrower sense, but of that other education in virtue from youth upwards, which makes man pursue the ideal perfection of citizenship, and teaches how rightly to rule and how to obey. This is the only education that, upon our view, deserves the name; the other sort of training, which aims at the acquisition of wealth or bodily strength, or mere cleverness apart from intelligence and justice, is mean and illiberal, and is not worthy to be called education at all. (Rusk and Scotland, 1965: 30)

From this we can see that the classical ideal of *liberal education* is very different from the Romantic ideal of freedom as being unbounded by ossified societal norms. It is even further removed from a contemporary caricature of liberal education as the individualistic pursuit of perfectibility unanchored by either societal norms or morality of any kind. For Plato, the term 'liberal' was associated with freedom *from* the vicissitudes and limitations of sensory perceptual knowledge, but it was also associated with freedom *to* pursue wisdom and exercise it *in* the polis, *for* the public good. Without these anchors of location and ethics, freedom would be little more than licence for self-aggrandizement and vanity. It is this classical understanding of liberal education that we endorse because it is best able to provide an experience of a collective

endeavour and an ethical orientation that values truthful knowledge over and above that which is instrumentally useful.

We do not need to accept Plato's explicitly elitist ontological beliefs about men of gold and so forth (he believed that only a divinely chosen few had the ability to pursue logical reasoning through dialectics) or endorse his view of a hierarchical social order in order to appreciate his general idea of liberal education entailing more than 'training' or 'mere cleverness'. If we forget the idea of wisdom and the public good, and value only educational performance and individual life outcomes that over-pepper our current educational discourse, then we risk, as Martin Robinson puts it, breaking 'a contract between the living, the dead, and the unborn' (2019: 10). There is a wealth of educational philosophy that develops different ideas of, and about, liberal education. And there is a rich literature in epistemology that explicates different forms of knowledge. However, as we discuss in the introduction, the curriculum itself, and knowledge for the curriculum, has come into public view more recently.

Robinson points out that our institutions, including schools and their curricula, can enhance or degrade the intergenerational contract expressed in a classical ideal of liberal education. This chapter explores the nature of disciplinary knowledge that we propose informs the school curriculum and is most compatible with a model of liberal education as justified above. Unlike Plato, we do not think sensory knowledge has no place in the pursuit of truth but rather recognize the contribution of Kant's identification of three cognitive faculties – senses, imagination and rationality – that are *all* prerequisites for knowledge. As we shall see, the arts are every bit as important as STEM subjects, and not merely as compensation for the rigours of studying the sciences.

We do not think that our proposed curriculum model is *all* that schools do or should provide. Nor do we think that success in academic subjects makes pupils better in terms of moral or social status. Even without disciplinary knowledge pupils could achieve high grades in public examinations; they may go on to obtain well-paid work; and their actions may be deemed to be ethically good. But we emphasize disciplinary knowledge because without it they will not necessarily have been introduced to specialized forms of knowledge, modes of thought *and experience*, which are the symbolic products of past human endeavours to better know the world and the people within it. The rest of this chapter is organized into the following sections: first, we provide an account of the development of language, associating its historical development with wider cultural developments of modernity and Enlightenment thought.

We then consider the contemporary challenge to this account posed by decolonizing discourses and conclude that its central conflation of epistemological and political boundaries seriously weakens its epistemological claims. Finally, we substantiate our rebuttal of decolonizing epistemological claims by providing an account of knowledge based on social realist epistemology and aesthetic theories. Where possible, we elucidate how theoretical insights have practical relevance for education in general and, more concretely, for teachers' practice.

Language

The existence of language is evidence that there is a prior social and symbolic world into which we, as individuals, are born. We do not each construct our own personal language. Even if possible, to do so would result in expressions that lacked meaning beyond the person constructing it. Knowledge from socio-linguistics informs us of the multiple functions of language, from catalysing psychological development, to communication and expression, to acting as tools of thought through which we interact with the external social and physical world (Halliday, 1973; Hasan, 1996; Vygotsky, 2012). The internal language or conversations we have running constantly in our minds is integral to what Archer (2000) maintains is vitally important for self-reflexivity and individual cognitive autonomy, which are uniquely human attributes. For Hasan, language has multiple functions: in everyday mode, it is an important means by which we 'suspend disbelief in the constructedness of social reality' (1996: 20), but in the specialized language of disciplines, language is a means by which we can 'examine the very reality created by it' (1996: 34).

In his exposition on the development of language, from icon to sign to symbol, Cassirer (1957, 1979) argues that the emergence of systematic secular knowledge has been coterminous with the growing abstraction of language as symbol. The development of our ability to think abstractly takes place at both societal and individual levels. He charts the developmental movement of social symbolic orders. The symbolic orders of early societies were based on totem. Totemic artefacts did not just represent divine power; they were its embodiment. As societies become more complex in their organization, so too do their symbolic orders, and greater abstraction and systematicity are part of this development. Linguistic symbols, unlike the image-based symbols of earlier societies, come to have a representational function. The most advanced stage

of symbolization is when linguistic symbols are organized within conceptual systems, and meanings are less dependent on one-to-one correspondence that characterizes earlier stages of language development. When language becomes fully symbolic, it is less tied to its function of *representing* reality, as in its earlier iconic stage of development, or embodying reality directly, as in its mythic stages of development. For Cassirer, it is when language is fully symbolic that we achieve a higher level of self-consciousness and are better able to apprehend and differentiate internal and external phenomena (social and natural).

Cassirer's account of symbolism makes it the ground for the possibility of objectivity. It allows humans to consider aspects of the external world of which they are a part of, but also stand at a distance from the independent objects and events of that world. Prior to this, thought was more closely determined by the contingencies of nature and human experience of its vicissitudes. Hence, Cassirer concluded that 'human speech always conforms to, and is commensurate with, certain forms of human life' (1957: 175). Such developments are part of broader cultural developments that emerge through the increasing complexity of humans' interactions with our environments as we learn to expand and apply our capacities to overcome limits, whether they be natural, cultural or socio-political. In this essentially optimistic view of human agency, Cassirer's work exemplifies a dominant strand of Enlightenment thought.

Decolonizing discourses

Cassirer was writing at a time when the intellectual and ethical gains of the Enlightenment were coming under increasing criticism from the radical scepticism of philosophers such as Heidegger, who advocated an extreme form of phenomenology and subjectivism (Krois, 1983). This critique of Enlightenment thought, and values, is at the heart of contemporary calls to decolonize the content, methods and practices of educational institutions in former colonial nations.

The decolonial argument proposes that the development of academic institutions dedicated to the production of theoretical knowledge was coterminous with the existence of colonialism, which entailed material and cultural appropriation (Mamdani, 2018; Rudolph et al., 2018). Mamdani writes that in Africa the imposition of Western scientific knowledge and its language effectively stunted, or killed, the growth of local knowledge and languages. To continue the same knowledge practices, without applying conscious decolonizing strategies,

is, it is alleged, to endorse the perpetuation of the cultural depredation created by historical colonialism. Various suggestions are advanced in order to make reparations for past injustices and/or purify morally tainted knowledge that, it is implied by some, will produce better knowledge for everyone (Bhambra, 2011).

Confining ourselves to the sphere of knowledge and its production, we would make the following points in response. In as far as decolonizing discourses bring questions of curriculum criteria for selection to the fore and prompt renewed intellectual focus on epistemological and aesthetic justifications, we think it is a positive development. It is true that curriculum selection involves sanctioning some knowledge content and excluding others. Part of the reason for the partiality of subject content could be blind spots or biases. Serious scholarship has contributed to critiques of curricula and has contributed to a welcome expansion in official history curriculum materials. One example is the OCR exam board's A-level option on African Kingdoms (Green, 2014). What would be problematic, however, is if its introduction to the social world of policy and schools were to be read as a proxy for political positions on racism or anti-racism. In our view, such a reception would distract from its educational value as an interesting new A-level option that expands the offer of substantive content as well as fresh concepts for historical interpretation.

There are, however, legitimate reasons for the intentional bracketing of local knowledge and languages from the work of producing disciplinary knowledge in academia, which I discuss in detail in this chapter. It is also worth remembering that without learning the language and knowledge of the colonizers, famous contributors to canonical knowledge, from Srinivasa Ramanujan (mathematics) to Chinua Achebe (literature), would have remained working within local social and knowledge contexts and our collective resource of knowledge would be poorer. Butcher (2018) has pointed out that ideas articulated by white canonical authors have inspired people throughout the world to pursue their own struggles against oppression. The words of Frederick Douglass testify to this truth. Writing about his encounter with works by Plato and Sheridan, as a 12-year-old slave, Douglass writes, 'They gave tongue to interesting thoughts of my own soul, which had frequently flashed through my mind, and died away through want of utterance' (Douglass, 1851: 40).

As we shall see later in this chapter, epistemological boundaries are the cognitive precondition for *universalizing* human thought and experience without which knowledge remains closer to opinion and belief. We need experiential knowledge, where meanings are primarily

grounded in sensory data, prior beliefs and interpersonal relationships. Such knowledge helps us navigate our social and personal lives. We also need disciplinary knowledge, whose meanings are grounded in abstract conceptual systems. This knowledge helps us better navigate the world of ideas, and to subject claims to a generalised, but fallible, standard of truth. Although they may be difficult to distinguish in practice, they need to be understood as analytically distinctive categories. The ethical question of equality, for us, remains one of access to subjects based on disciplinary knowledge, irrespective of background, interest or individual ability. If this seems impossible under the current regime of technocracy and data-capturable performance, then we would argue that it is here where wholesale changes need to be made.

The curriculum needs to be open to revision and renewal, but the key question is, under what criteria? We think the claims of decolonizing discourses merit *review* of the curriculum at the level of content selection, but only if sufficient epistemological criteria are supplied: we are not persuaded that disciplinary boundaries of knowledge and methodology should be rejected. The next section aims to substantiate our claims by providing an explanatory account of some important internal features of disciplinary language and knowledge.

Disciplinary knowledge

Writing at different times, and with different intellectual interests, Cassirer (1957), Durkheim (1915), Bernstein (1999, 2000), and today's social realist theorists provide accounts of epistemological boundaries that mark the difference between everyday and specialized concepts in language and knowledge. Cassirer, for instance, illustrates this with the following example. 'Bird' is a more general concept than 'parrot'; both are everyday concepts, although we could say that 'parrot' is more specialized than 'bird'. By contrast, Aves (the class of vertebrata that includes the birds) is the most specialized concept; its meanings are relocated from the world of everyday experience to the ideational world of disciplinary biology. The greater semantic precision the class of Aves derives rests in its relationship with sets of other specialized disciplinary concepts, cohered by the rules and procedures created by communities of biologists. Meanings become *less* iconic and analogous, and as they become more fully symbolic they also become *more* arbitrary and metonymical.

We can illustrate the process of meanings moving from concrete to abstract in relation to mathematics by elaborating on an example used by

Young and Muller ([2008](#)). They use the scenario of a young child planning a party with a parent. The child is asked who she would like to invite:

STAGE 1   Jane, Mary and Sue = meanings are concrete and specific in the form of linguistic sounds, which are embodiments of particular people and relationships.

STAGE 2   'One, two, three' (friends) = child counts on fingers and speaks the linguistic name of numerals. Meanings are still concrete (counting on fingers, which are proxies for the friends' names) and in the form of linguistic verbal signs.

STAGE 3   '1', '2', '3' (friends) = child counts on fingers, speaks and writes down the mathematical numerals. Meanings are shifting towards the abstract in the translation from linguistic to mathematical language, and in using written as well as verbal form.

STAGE 4   1, 2, 3 (friends) = written symbols alone.

As Young and Muller explain, Jane, Mary and Sue are specific and singular while three friends has wider applicability – or powers of generalization and the concrete variables of the singular features of Jane, Mary and Sue are bracketed. It is important to note, once again, that disciplinary knowledge is not opposed to everyday language: it is better understood as a specialized sub-set, with each discipline possessing its own specialized lexicon, grammar and procedural rules. It is through being able to operate with these intellectual tools that disciplinary knowledge is acquired, then developed with, and disseminated among, other members of the disciplinary community.

It is important to remember that the disciplinary communities and procedures are not, *by themselves,* sufficient guarantee of reliability, any more than a syllogism provides reliability in logic. If the premises are false to begin with, conclusions arrived at by rigorously following methodological steps can still be epistemologically, and ethically, unsound. Some form of commitment to the transcendental ideal of truth is needed (Alexander, 2006). In traditional epistemology, for a statement (P) to be accepted as truthful knowledge as opposed to opinion or belief, it needs to meet three conditions. The classical formula is:

The statement 'P' is true is believable = this is the psychological condition.
The statement 'P' is true = this is the truth condition.
There are good reasons to accept 'P' = this is the evidence condition.

The complexities and controversies of this formulation of knowledge have been the subject of longstanding philosophical enquiry, which is

fascinating but beyond our scope here. For our purposes, we agree with Backhurst's account of knowledge as a rational capacity whose 'successful exercise … yields belief that cannot be false' (2020: 260). In exercising rational capacity, theoretical knowledge is essential because it allows the world and the individual knowing the world to come into view in a specifically undetermined way (that is free from determinations given by nature, and relatively free from those of the social world). Or, as Rödl argues, 'theoretical knowledge is of nature, practical knowledge of freedom' (2020: 295).

The next section gives an account of social realist epistemology and aesthetics, which provide the best theoretical resources for understanding and justifying curriculum knowledge. Our aim is to help bridge philosophical insights about knowledge and education with sociological insights about schools and curricula, or at least bring them into conversation with each other.

Social realist epistemology

Social realist epistemology is rooted in the work of Bernstein and Durkheim. The focus is less on providing an ontological description of knowledge, which is a central task of philosophy. Social realism accepts knowledge as a realist category; the focus is on accounting for its sociality as 'compatible with confidence in the ideas of truth and objectivity' (Backhurst, 2020: 263). According to Moore (2013), Bernstein took Durkheim's more ethically grounded discussion of sacred and profane knowledge in *The Elementary Forms of Religious Life* and applied the distinction in his own sociological description of school knowledge codes. The two main knowledge boundaries Bernstein identified, and which are central to social realism are:

1. The differentiation between everyday and specialized knowledge, or between *horizontal and vertical discourses* (Bernstein, 1999)
2. The differentiation between *horizontal and hierarchical knowledge structures* that exist *within* vertical discourse. Both knowledge structures can be weakly or strongly classified and weakly or strongly framed (Bernstein, 2000).

Classification refers to the strength of the boundaries between the different contexts that shape education. It could be applied to the relations between external influences, academic departments, national and local

governments, professional bodies, unions, exam boards and so forth; however, it could also apply to more internal aspects such as the arrangement of teaching spaces within a school or the selection of curriculum content. Framing, similarly, refers to the strength of boundaries but between sources of pedagogic control and the principles through which meanings are shaped. To illustrate: a single subject whose content is selected from mainly disciplinary criteria, taught by didactic approaches, using specialized vocabulary for instruction, in a classroom dedicated to that subject, would be *strongly classified and framed*. A subject that is a combination of disciplinary knowledge and content, and knowledge construed by employers or other external agencies, taught through a range of approaches, and combining specialized and everyday vocabulary, in a multi-purpose space, would be more *weakly classified and framed*.

For the purposes of this book it is important to emphasize that a subject can be strongly classified and framed in terms of its content and its disciplinary principles *but be weakly* classified and framed in terms of its pedagogy. This is particularly important at a time when powerful knowledge is often wrongly equated with strongly classified and framed pedagogy and learning strategies.

Horizontal and vertical discourses

A strong discursive boundary between knowledge in vertical and horizontal discourses is important, but disciplinary knowledge is not created *ex nihilo*: ultimately, its roots lie in *the same* knowledge and language in which, and through which, we live our everyday lives and conduct our relationships. Even the highly abstract concepts in mathematics have been recognized by philosophers, including Kant, as being synthetic (depending on some empirical element) rather than purely analytic in the way of a syllogism.

Concepts are the ideational, linguistically clothed tools by which we are able to internally apprehend aspects of the external world and events (Cassirer 1957). We use concepts in both horizontal and vertical discourses, but their meaning orientations and functions are different. Once constructed – or made into objects of disciplinary knowledge – concepts are abstracted from the meanings that the same linguistic term has in horizontal discourse.

For example, the concept of 'the War of the Roses' in horizontal discourse refers to the actual series of events occurring at a particular time and place and articulated in the particular linguistic symbols. When abstracted and relocated in vertical discourse, the same linguistic symbols acquire different sets of conceptual meanings. In the discipline of history,

the concept 'War of the Roses' is placed in relationship to other established historical conceptual categories, including political power, religious conflict and the development of nation states (Sehgal Cuthbert, 2017). The conceptual shift, or cognitive dissonance, involved in operating with concepts in vertical discourse is what creates initial difficulties for pupils, but it also what creates the cognitive condition for being able to stand in a position of detachment from the knowledge meanings in horizontal discourse. The meanings of our everyday concepts tend to rely more on empirical *social* experience, while specialized concepts used in all subjects within vertical discourse rely on knowledge of cognate inter- and intra-disciplinary concepts. Of course, this too is experience, but it is intentionally focused on a narrower set of goals; the experience sought is primarily either to develop, or produce, knowledge (higher academic levels) or to transmit existing knowledge (educational).

The function of concepts in vertical discourse is primarily to test and improve existing disciplinary knowledge, that is to say, knowledge that has been verified as reliable and true under the best knowledge conditions to date. In contrast, the meanings of concepts in horizontal discourse are directed towards fulfilling personal interests or conducting interpersonal relationships. Their meanings are accessible via tacit and experiential knowledge rather than propositional elaboration. Schools, unlike universities, are hybrid institutions, which we explore further in Chapter 2. They have a broader social role in the *socialization* of the next generation, and therefore, they exist within horizontal discourse. But in as much as they are also sites for *education*, they deal with knowledge within vertical discourse.

In horizontal discourse, social constructivist descriptions of knowledge seem apt: knowledge meanings are made and re-made in each interaction and there is little to codify in any systematic way. To try and codify knowledge in horizontal discourse would negate its function: it needs to be conceptually loose to deal with the infinite variations of peoples' lives. In fact, as Polanyi (2012) argues, often formal elaboration of concepts in everyday knowledge can be counter-productive, as illustrated by his example of riding a bicycle. If we tried to articulate what we are doing when riding a bike, we would probably fall off. Similarly, the knowledge of how to ride a bicycle is not easily conveyed through propositions. It is better demonstrated as a form of practical knowledge by example.

Knowledge of social realist epistemology can help us in various ways. It allows knowledge to be foregrounded and no longer taken for granted as it has been in educational research and the profession. This

visibility, and relative autonomy of formal knowledge, may go some way towards justifying the importance of the intrinsic educational value of subjects, and of education in general. The concept of vertical/horizontal knowledge boundary can help teachers consider whether curriculum or pedagogic initiatives are closer to educational, or instrumental, goals. The concepts of classification and framing can help us see beyond the issue of curriculum content selection alone.

For example, *strongly classified* literary text, say a play by Shakespeare, could be *weakly framed* pedagogically. It is not uncommon to use problem pages or diary entries as written tasks to assess literal or inferred recall or personal response to literary texts. It is a practice encouraged in professional materials as well as by some exam boards. Diaries and problem pages are forms of writing found mainly in horizontal discourses. Linguistically, they rely largely on a first- and second-person form of address and draw on everyday meanings. In this way, the disciplinary, literary meanings become relocated within the contemporary everyday world in a way that risks losing something important about the text's thematic meanings and aesthetic power. In terms of writing, an over-reliance on tasks that use informal first-person forms of direct speech means pupils are less familiar with the more detached third-person narrative voice (and linguistic devices) needed for essays. The risk is that the text becomes a *pretext* for a task rather than *the object of study*.

Hierarchical and horizontal knowledge structures

Bernstein introduces a further set of knowledge differentiations *within* vertical discourse: hierarchical knowledge structures and horizontal knowledge structures. The main difference lies in the way disciplinary knowledge deals with its empirical or textual referents and its principles of integration and grammaticality (Moore, 2013; Young and Muller, 2016) – in other words, how knowledge is established and progresses in different disciplines. Natural phenomena, which constitute the objects of study in the sciences, have physical properties that behave according to laws of nature. They have a high level of order and systematicity. Objects of sciences can be studied in closed experimental, largely replicable, conditions where variables can be minimized, even if not totally excluded. The concepts constructed through such methods have a high level of generalizability because they subsume features shared by many empirical instantiations and discount contingent variables. Although even in the most controlled experiment, subjective aspects of judgement and imagination in initial hypothesizing have a role, they are

not central to the experimental procedure itself. Here, the focus is on empirically observable and measurable features and events. Without this necessary excision of subjective features, scientific knowledge would lose its particular powers of generalizability.

For example, within the discipline of chemistry, the symbol for any element from the Periodic Table provides a precise description of all the features of the referent *as it exists within the academic discipline,* such as its atomic mass and weight and so forth. The symbol 'Au' describes a universal model of gold that is accessible, in principle, to anyone who has been inducted in the disciplinary knowledge to a certain level. This form of knowledge can be re-contextualized in a wide range of contexts without losing much by way of its powers of prediction and explanation. With each re-contextualization, knowledge is tested through experimentation. Existing knowledge can be affirmed, disproven or modified. When there are competing claims, disputes can be settled by comparing 'consensually agreed-upon evidence' (Maton, 2014: 86). What survives eventually is accepted as better disciplinary knowledge.

The epistemic nature of hierarchical knowledge structures subjects, of which physics is an exemplar, has important implications for teaching. First, it means that everyday and specialized meanings of concepts need to be explicitly introduced. Wayne Hugo provides a clear illustration of what this can look like in reference to an official science textbook's account of 'energy' and 'work' through six carefully constructed statements, where meanings move from everyday to specialized. To summarize, the first statement is, 'In order to do anything, breathe, get out of bed, do your homework or play soccer – you need energy.' The third is, 'In science we say that energy is needed to do work.' At this point meanings are explicitly located within a disciplinary rather than everyday context. The fifth is, 'For example, if you push a box along a table, you are doing work.' And the final, sixth, counterintuitive statement is, 'The box is also doing work' (Hugo, 2014: 6). The second implication is that the sequencing of concepts is very important: if conceptual steps are missed, or poorly understood, then it will be difficult for pupils to make progress.

By contrast, the social sciences and humanities have horizontal knowledge structures, and knowledge progresses along different principles to those of hierarchical knowledge structures. In Bernsteinian terms horizontal knowledge structures lack the empirical evidence, and principle of re-contextualization, through which high levels of consensus are established in scientific communities. In horizontal knowledge structures we have re-contextualizing principles of interpretation and (re) iteration of canonical texts rather than controlled laboratory-based

experimentation. Instead of concepts being subsumed with ever-increasing degrees of abstraction, we have an expanding 'series of specialised languages with specialised modes of interrogation and criteria for the construction and circulation of texts … Thus, in the case of English literature the languages would be the specialised languages of criticism' (Bernstein, 1999: 162). At this point, the limitations of Bernsteinian analysis are clear: his knowledge classification may be an apt description of literary *criticism*, but it has little to say about literature itself. Literary criticism, like criticism in other disciplines, is analytical, and although analysis has a place in studying literature, it is different from literature as an aesthetic work of art. The latter presents us with a particularly elusive object of study: one that is qualitatively different from the objects of either hierarchical or horizontal knowledge structures.

Significance of objects of study

One important insight Cassirer (1957) draws attention to is that the principles that shape the creation of formal knowledge (or vertical discourse in Bernsteinian terms) depend on the properties of *what* is being studied. The natural, social and immaterial phenomena of the world cannot *all* be successfully subjected to the same principles of objectivization.

In the social sciences and humanities, the objects of study are social facts. In languages, for example, the object of study is a symbolic system shared by a linguistic and cultural community (Hasan, 1996). The objects of study in history are *past* events for which there are no direct empirical correlates. In history, new knowledge is arrived at through constructing new, more developed and complex interpretations either based on considering new empirical evidence in the light of existing historical theoretical knowledge or by reconsidering existing knowledge in the light of new theoretical development. There are central concepts that subsume a range of empirical and textual referents, which is a similar feature to scientific concepts. However, overall, knowledge in history develops as new interpretive frameworks are developed along a horizontal axis such as national history, world history and social history.

The objects of study in foreign languages are complex linguistic systems of symbols that are rule-bound in terms of phoneme–grapheme correspondence and syntax but less rule-bound in terms of interpreting, and creating, meanings. Progress in languages consists of, among other things, practical knowledge (speaking and writing with greater fluency and accuracy) *and* propositional knowledge of cultural meanings as well
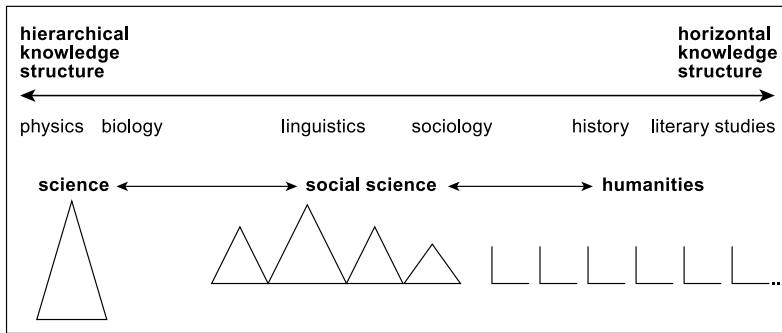
Figure 1.1　Hierarchical knowledge structures within vertical discourse (Martin et al., 2010, 438; reproduced by permission)

as grammatical rules. As Lawes argues in Chapter 7, learning a language can be reductively framed as technical, linguistic knowledge or more expansively framed with a model of culture. Although different languages share central concepts, each exists along a horizontal axis as a discrete epistemological unit.

Figure 1.1 illustrates the structures of knowledge development in hierarchical and horizontal knowledge structure.

English literature, like other forms of art, has *a unique object of study*, unlike the physical and social objects central to the sciences and humanities. In the arts, the object of study is human subjectivity itself, and we cannot stand in the same relationship to our inner mind as we can to the objects of the natural and social worlds (Cassirer, 1957). Our perceptual apparatus plays a key role in subjectivity and experience, and both are often associated with private immediate sensory and transitory feelings alone. Hence, experience has come to be considered as formless and lacking features of order or regularity, often assumed to be the *only* markers of rationality and rational knowledge. On this basis, it is difficult to see how *any* knowledge could be constructed from such an object of study.

McPhail, in his discussion on music, writes that what is needed are 'generative concepts that underpin our experience of its [music's] aesthetic dimensions and the embodied craft of its production' (2017: 126). This applies to other forms of art that constitute, as Abbs writes of literature, a 'discipline of the imagination' (1994: 139). Aesthetics, which deals with philosophical questions of sensory-based knowledge and imagination, provides a rich resource from which such concepts could be constructed.

Aesthetics

Langer (1957) argues that from within an epistemological framework of the physical sciences human experience poses a conundrum. This is because although feelings have empirical correlates within brain functioning and the nervous system, and they have a temporal existence, they have *no* spatial existence. This contributes to the difficulty traditional epistemology has had in accounting for knowledge in the arts. Elsewhere Langer writes, 'it is hard to form an idea of anything that has no name' (1957: 7).

Such difficulties notwithstanding, Cassirer (1956, 1979) and Langer (1957, 1961) draw on aesthetic theories to construct a radically different understanding of experience that, at the least, softens the conventional Cartesian dichotomy of mind and body. Our senses, through which we perceive and experience aspects of the external world, are better understood as portals of our mind rather than categorical opposites to the mind. Human experience, our inner life, is part of reality and has structure, but it is hard to know, name or classify it. The structure of experience is connected with 'the way living in the world feels' (Langer, 1957: 7). In this sense, subjectivity is something deeper and more consistent than fleeting feelings alone.

Cassirer and Langer propose that the aesthetics of art, rather than logic or analytical knowledge, is where subjectivity can be objectivized without wholly surrendering its unique experiential and sensory dimensions: the qualia of the world. Because subjectivity includes intuitions, beliefs, values, feelings and prior knowledge of life *as well as* formal knowledge, aesthetics and the imagination are better able to deal with disparate subjective phenomena than the epistemological tools of abstract reasoning, logical analysis and empirical experimentation.

Aesthetically successful art, whatever type (music, literature, painting and so forth), evokes the reality of subjective experience in a mediated way that points us back to our own sensory-perceptual, rational and emotional capacities through which we experience and interpret our internal and external world. Aesthetic experience is more free than everyday experience because it lacks the pressure to immediately act, calculate, decide or judge for reasons directed at meeting extrinsic aims. In other words, aesthetics as well as rationality is the ground for the intelligibility of the world. Works of art create a mediated space of aesthetic experience or reflection that allows us to stand at a distance from aspects of our own subjective experience and appreciate the

subjectivities of others. The others include the artist and all the other audiences past and present, and across geographical boundaries.

In Crowther's gloss on Gadamer, 'art stems directly from the experience of shared subjectivity – a mutual recognition of common forms of relatedness to the world' (2007: 102). This process of universalizing experience that is embodied *in individuals*, and in individual works of art, is echoed by Young and Muller (2016) when they write that the concept of generalization might apply in the arts in so far as they introduce individuals to universal dimensions of human experience. To elucidate this further, we need to consider the faculty of imagination.

The centrality of imagination in the arts

It is true that Kant had little time for art; his *Critique of Judgement* (1790) located concepts of beauty within nature (Kneller, 2007). Nonetheless, the following quotation suggests he held a less rigid view of knowledge than commonly supposed:

> Thoughts without [intensional] content (*Inhalt*) are empty (*leer*), intuitions without concepts are blind (*blind*). It is, therefore, just as necessary to make the mind's concepts sensible – that is, to add an object to them in intuition – as to make our intuitions understandable – that is, to bring them under concepts. These two powers, or capacities, cannot exchange their functions. The understanding can intuit nothing, the senses can think nothing. Only from their unification can cognition arise. (Hanna, 2018: non-paginated)

Kant posits a semantic interdependence between concepts and intuitions and claims the imagination is *the source* of all knowledge, but it cannot provide its combinatory rules (Kneller, 2007). But he does not really elaborate how the imagination functions as 'the source of *all* knowledge'.

Crowther (2007) draws on a combination of Kantian aesthetics and psychological theories of identity formation to elucidate the relationship between concepts and imagination that Kant left undeveloped. He argues that chronologically and logically our primary mode of apprehending the world is imagistic. Here, the term 'image' applies to our intuitions that arise from *all* our sensory apparatus; it is not restricted to the visual alone.

As pre-linguistic infants, Crowther argues, there is an isomorphic consistency between the object and our internal image of it. The unity of

imagistic apprehension renders our experience of the object immediate, vivid and holistic. In the repetition of experiences and acts of sensory intuitions, we come to navigate ourselves within an external world of objects and people. Through this relational process we begin to form an initial sense of self-identity.

Thus, our first introduction to concepts – broadly defined as ideational tools through which we reconstruct external data internally in our mind – *is aesthetic in character*, which is to say, concepts have an imagistic aspect (closer to visual sensory perception) as well as linguistic. Crowther argues that a presupposition of abstract concept formation and application is that we can engage with factors that are not immediately present in the perceptual field. For generalization, we must have 'some sense of what it is like for the [conceptual] terms to apply to same or similar items and contexts in different times and places' (Crowther, 2007: 71). To be clear, Crowther is not speaking only in relation to a class of artistic concepts; his claims are made in relation to all abstract concepts.

The spatial and temporal projection needed for the generalization of concepts requires something different from other concepts. The cognitive motor needed for this projection is the imagination. Without this power, early concept formation remains closer to their 'ostensively rigid animal mode' (Crowther, 2007: 132). Imagination, not conceptual thought, is what renders 'the presentation of sensory data conceptualizable even though in itself, it [imagination] is logically disinterested from concepts' (Crowther, 2007: 71). In this way we can begin to see how the imagination plays an active and constructive role in concept formation and application, as Kant intimates.

While Crowther's account of early infant identity formation may seem marginal to the concerns of secondary teachers, his account of sensory concepts touches on the perennial problem *all* teachers face when trying to ensure that pupils are better able to internalize conceptual content so their understanding is substantive rather than superficial and rhetorical. When this happens, an isolated concept fits pre-existing cognitive and affective schema in ways that can generate further inferential associations. It is an account that has affinities with Piaget's concept of schema as discussed by Kirschner and Hendrick (2020). Arguably, the overlap of concepts from aesthetics and psychology could be read as a form of mutual validation. Perhaps the initial moment of knowledge integration is captured when a pupil, using everyday language, says 'Ah yes, now I see'.
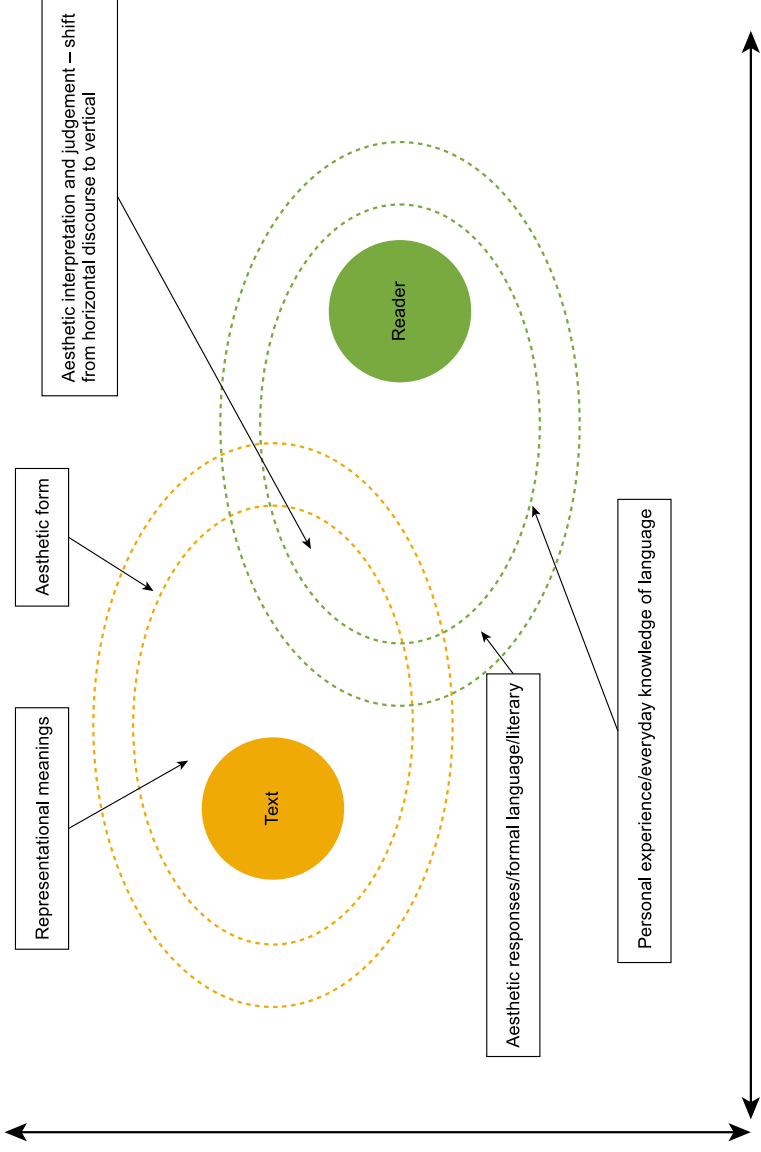
Crowther also develops Kant's distinction between two modes of imagination: the reproductive and the productive. The former is directed

by a 'relevant concept', or specific goals, and is 'part of the basis of everyday cognitive life' (Crowther, 2007: 71). By contrast, the productive or creative imagination is directed more by aesthetic judgement and interpretation *within a specific artistic tradition*. This suggests that an art education that, for whatever reasons, rejects traditional texts or works is withholding a resource vital for developing the productive imagination of pupils. The difference in modes of imagination also calls into question the idea that there is a continuum between creative making in which children spontaneously engage and making an object intended to be received as art. Both the making of art *and* its reception by an audience involve productive imagination. The artist engages the imagination in productive mode to create a work whose *formal unity* is capable of evoking a powerful and complex aesthetic response, and the audience engages it to *interpret* and re-experience expanded and deepened subjective responses mediated through an interpretive engagement with the work's *form*.

Artistic or aesthetic form, according to Langer, comprises of 'a composition of tensions, resolutions, balance and unbalance [and] rhythmic unity' (1957: 8). It is a concept that refers to the work as a unity. In painting it is achieved through composition of line, colour and spatial relations that undergird the ostensive subject being represented in the work. In literature it is achieved through composition of language, which includes syntax, vocabulary and the rhythmic and prosodic patterns. Aesthetic form and productive imagination aim at the evocation of quantitative and qualitative categories of relation (similar to Langer's description of composition) rather than empirical concepts (Crowther, 2007). For this reason, the representational content in art is not insignificant, but it is not the determining factor of aesthetic form. The structure of knowledge progress in the arts exists in the extension and deepening of meanings between individual personal responses engaging with a text, across a wider range of discursive and experiential contexts. Visually, in contrast to the linear diagrams that illustrate hierarchical and horizontal knowledge structures, aesthetic knowledge structures are better illustrated with overlapping circular shapes. As suggested in Figure 1.2, the area in the middle is where responses are shared, developed and refined through making interpretations and judgements. It entails a profoundly dialogic and collaborative pedagogic relationship where teacher and pupil move iteratively between different knowledge structures, values and beliefs and, so, also between vertical and horizontal discourses. None of this is a problem if teachers are aware of when they are shifting between levels of meaning and why.

Aesthetic experience/knowledge of text as public work of art

Aesthetic interpretation and judgement – shift from horizontal discourse to vertical

Aesthetic form

Representational meanings

Reader

Text

Personal experience/everyday knowledge of language

Aesthetic responses/formal language/literary

Axis of literary approaches (for example, genre, works of individual, historical, feminist, post-colonial)

Figure 1.2   Structure of knowledge progress in aesthetics (image by the author)

There are important implications for art education. In the case of literature, for example, when selecting texts for study, the first criterion should be whether the text has a strong enough aesthetic form to generate interpretive interest. *If* the book meets this criterion first, other criterial standards can be applied according to local context and aims. The English teacher has greater flexibility in grouping and sequencing texts than the science teacher has in grouping and sequencing substantive content. Of course, depending on the text and the class, some explanatory contextual knowledge, historical or linguistic, may be helpful. But this is not where a text exists as *an aesthetic object*: meanings cannot be explained away in terms of linguistic, historical or political knowledge. It is important to emphasize this point in today's context where there is a tendency among sections of the profession to overuse E.D. Hirsch's concept of core knowledge. This is sometimes taken to mean that a great deal of contextual historical or linguistic knowledge is needed prior to reading. But neither history nor linguistics are the 'core' of literature understood aesthetically, and currently fashionable terms such as 'didactic teaching' and 'core knowledge' if understood as technical tools can suppress rather than prompt pupils' powers of imagination. Less room is left for the serendipitous chances of aesthetic interpretation.

Conclusion

In this chapter we have explored the special character and different forms of disciplinary knowledge, how it differs from everyday knowledge and why it is significant in curricula. Knowledge, as a form of symbolic representation, has developed socially and historically from mythic modes of symbolization to abstract, scientific *and* aesthetic modes. If accepted, our argument makes it possible to chart a mid-way between two opposing caricatures of knowledge. The first is a naturalistic view, which conceives of knowledge as something fixed in its propositional form and to be passed on via chosen individuals. The second conceives of knowledge as socially constructed but understands the social as that which exists in horizontal discourse only. The first caricature eviscerates the conceptual and aesthetic substance of knowledge and reduces knowledge to propositional statements alone; the second affords little or no status to knowledge as being real and relatively autonomous from contexts of social, economic and political power.

Having analysed the structure of knowledge progress in its hierarchical, horizontal and aesthetic forms, we can see that hierarchical

knowledge structures are but one type or structure of knowledge and may even be the exception. Yet, over the course of the late nineteenth and twentieth centuries, an epistemological description of one form of knowledge has come to be understood as an ontological description of all knowledge. There may be sound social or political reasons for such a development, reasons to do with its scope for application to social problems perhaps, but these have little to do with intrinsic educational goals. The fact that the different knowledge structures objectivize different aspects of reality points to the desirability of providing a broad and balanced curriculum. Unfortunately, this has not been the dominant trend of recent educational policy in England, which has favoured STEM subjects over the humanities and arts.[1]

We have argued that social realism and aesthetics provide the intellectual resources with which teachers can construct their own pedagogic principles, an understanding of which is a precondition for the beginning teacher to be able to construct educationally robust curricula through which all pupils are introduced to a liberal education. As such, any teacher education course that aspires to provide teachers with a rich intellectual footing on which to develop their professional practice and identities should include something of social realist epistemology and aesthetics.

Note

1   A brief overview of the introduction of STEM in British education can be found here: https://www.raeng.org.uk/publications/reports/uk-stem-education-landscape (accessed 20 June 2020).

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2
School subjects

Alex Standish

The task of an educational system … is to ensure movement from everyday meanings to abstract and general concepts and then back again.

(Hugo, 2014)

What is a school subject?

Schools, as places of learning, introduce children to humanity's intellectual traditions that take them beyond their personal experiences (Pring, 2013; Young, 2011). Through the study of subjects, 'students are drawn from their world and made to enter a new one' (Masschelein and Simons, 2013: 38). While children may be familiar with the world around them, animals, plants, landscapes, cityscapes, different countries, different cultures and so forth, the theoretical and conceptual frameworks drawn from disciplinary knowledge, as discussed in Chapter 1, enable the child to see the world differently: they begin to see a greater range of differences and to recognize patterns, structures, connections, purposes, processes and how phenomena have evolved. The following extract from *In Defence of the School* exquisitely captures an aspect of this transition:

> She had seen those animals often. She knew some of them by name. The cat and the dog, of course – they run around at home. She knew birds too. She could distinguish a sparrow from a tit and a blackbird from a crow. And of course, all the farm animals. But she never gave it a second thought. That's just how it was. Everyone her age knew these things. It was common sense. Until that moment. A lesson with nothing but prints. No pictures, no movies. Beautiful prints that turned the classroom into a zoo, except without the cages and

bars. And the voice of the teacher who commanded our attention because she let the prints speak. Birds got a beak and the beak a shape, and the shape spoke about the food: bug eaters, seed eaters, fish eaters … She was drawn into the animal kingdom, it all became real. What once seemed obvious became strange and alluring. The birds began to speak again, and she could suddenly speak about them in a new way. That some birds migrate and others stay put. That a kiwi is a bird, a flightless bird from New Zealand. That birds can go extinct. She was introduced to the dodo. And this in a classroom, with the door closed, sitting at her desk. A world she did not know. A world she had never paid much attention to. A world that appeared as if from nothing, conjured by magical prints and an enchanting voice. She did not know what surprised her most: this new world that had been revealed to her or the growing interest that she had discovered in herself. It didn't matter. Walking home that day, something had changed. She had changed. (Masschelein and Simons, 2013: 42)

This example provides a brief insight into the transformative potential of education and how the acquisition of specialized concepts, language and ways of thinking change our interpretation of and potential interactions with the world that we encounter. However, in making the leap from disciplinary communities in universities to the school curriculum an important first step is to consider the different context in which schools operate and understand that their mission, while related to that of universities, is not the same. For one, schools are for children and so have a role to play, alongside parents, in raising the child into an adult. Schools are more likely to focus on the whole person, the development of character for instance, while in universities education has tended towards teaching specialist areas of knowledge and less on the maturity of personal conduct (although we are by no means suggesting that the personal and intellectual are unrelated). Moreover, schools do not just prepare children for further study, but also for work, life and being citizens of a democracy. As Erich Weniger surmises, 'it is probable that school subject and discipline must first conjoin in relation to a third entity that instils meaning into both the purpose of the discipline and the goals of instruction' (2000: 116). In essence, school subjects provide an introduction to disciplinary and cultural or social knowledge, but are *re-contextualized* in an institution with a particular mission (Bernstein, 2000). Given this, we need to say more about educational purpose and how knowledge contributes to the maturation and growth of children.

Gert Biesta (2010, 2017) identifies three purposes for education: qualification, socialization and subjectification. One of the functions of schools is to help children obtain socially sanctioned qualifications. Most qualifications are nationally organized and sanctioned by the Department for Education and its regulating body – Ofqual (Office of Qualifications and Examinations Regulation). Passing qualifications gives a focus to study and provides external *validation of learning* for students. As markers of achievement, qualifications have significance for life after school – both further study and employment. While knowledge gained in a qualification may or may not be directly applicable in a work place, many employers view them as proxies of work habits, skills and dispositions, especially the ability to apply oneself to a given task and succeed (Wolf, 2002).

Schools are also communities where children learn to socialize with peers and are inducted into societal norms and traditions by teachers and other staff. Through school, 'we become part of particular social, cultural and political "orders"', suggests Biesta (2010: 20). We noted above that the selection of curriculum content was linked to 'who we are and what we value' and hence will always reflect the local and national culture, values and traditions, but also projects outwards to engage with other cultures and global developments. In Britain today the nation and many local communities are multicultural, which needs to be reflected in the curriculum. In addition to epistemic knowledge, the curriculum therefore includes *social knowledge* about the community and its people. This would include historical, geographical and cultural narratives, traditions, festivals, customs, symbols, institutions, norms and significant people, such as great writers, artists and explorers. A school curriculum then comprises of both disciplinary and social or cultural knowledge, which will tend to blend together in subjects like English and history. For instance, in English literature it would make sense to study great national authors, such as Jane Austen and Dylan Thomas. And, the history curriculum is likely to include the story of the nation (or nations) and how they came to live under one state, as well as defining moments such as wars and movements for civil rights (see Chapter 9).

In liberal democracies, induction into a national community and identity are important for the effective functioning of democracy, the economy and community relations, hence 'partial loyalty to the nation state' is a key function of education, suggests Elizabeth Rata (2012: 67). She proposes that education provides the basis for 'non-kin associations' through 'establishing and maintaining relations of trust between people based on contract not status' (2012: 67). She continues, 'the objectivity

and critical reasoning needed for scientific inquiry is also needed for democracy', which includes the capacity to engage constructively in political debate and to argue for changing social institutions and policies (2012: 80). 'Partial loyalty' does not equate to nationalism but rather suggests individual commitment to democracy and society. However, in educating the whole person and deepening their appreciation of culture and humanity, the study of other people, other cultures and other languages is key to liberal education, as explored in subject chapters that follow.

We will look at Biesta's third purpose, 'subjectification', in more detail since it currently receives the weakest validation in an education system that has drifted towards 'valuing what we measure' rather than 'measuring what we value' (Biesta, 2010: 12), if indeed measurement is needed. For Biesta, subjectification means the process of becoming a subject or authors of our own lives. Like others, he views education as the development of individual autonomy, the 'propensity for free thinking', which he traces back to Kant's notion of rational autonomy (2010: 76). Biesta suggests that educational experiences and knowledge can be conceptualized as 'coming into presence' with the world. This is a gradual and relational process in which the pupils' experience of the world is mediated by the teacher (as with the girl's encounter with the animal prints above). Biesta describes it as 'a process through which we come into the world … and the world comes into us' (2012: 43). And, as it comes into us, we learn to see the world anew – our eyes are opened to new horizons and questions we have never previously considered, let alone tried to answer.

In *The Rediscovery of the Teacher*, Biesta (2017) makes a valuable defence of the role of the teacher, whom we have seen play a critical role in enabling the child to 'come into presence' with the world, so the teacher is not just a 'facilitator of learning'. However, what is sometimes missed by schools and educationalists who advocate a knowledge-led approach to curricula is that delivery of subject knowledge is not necessarily the end point. While learning concepts, facts, principles and skills are all important, the more interesting question is, what does the pupil do with this knowledge and skills? As Vygotsky argued, language is the medium of thought (Derry, 2013). While teachers can set learning objectives and assess pupils' understanding of concepts and performance of skills, the essence of education is that it is open-ended. All teachers know that lessons sometimes go in unanticipated directions. Teachers also need to find out what their pupils are thinking and what meanings they have taken from the lesson content. When objectives-led teaching

sits within a culture of target-driven performance and accountability there is risk that education gets reduced to a tick-box approach to learning. As Lawrence Stenhouse noted, 'Disciplines allow us to specify input rather than output in the educational process. This is fairer to the individual needs of students because, relative to objectives, disciplined content is liberating to the individual' (1970: 77). Knowledge is potentially liberating because it provides the tools for independent thought, imagination, critique and reflection on personal experience.

We can take the logic of developing independence further, and indeed Biesta does just this. Subjects do introduce children to disciplinary-specific ways of enquiry and practice, reflecting different knowledge forms and structures (see Chapter 1), as illustrated in the subsequent chapters of this book. But the aim is for the pupil to slowly take ownership of these ways of thinking and doing, as they learn to pursue questions for themselves. Biesta explains it thus:

> The key educational challenge, therefore, is not simply to tell the child or student which of their desires are desirable, but for this question to become a living question in the life of the child or student. (2017: 18)

In other words, it takes the skill of an impassioned and committed teacher to draw a child into the intellectual mindset of the discipline and show them that there are potentially more interesting and profound ideas and practices to be concerned with than the everyday preoccupations of the average teenager. Successful education also involves commitment and volition on the part of the child because learning subject knowledge and disciplinary methods and techniques is challenging. Through dedication to study, pupils begin to internalize values associated with intellectual work including 'devotion, respect, attention and passion' (Masschelein and Simons, 2013: 68). As children begin to internalize knowledge and intellectual habits from the teacher 'the self of the student takes form' (55).

In this sense, education is sometimes viewed as an interruption or disruption of a person's existing ideas or world view, because assumptions have been challenged, a different perspective on a matter has been introduced or a new theory has been proposed that questions the validity of a previously held notion. It is in this vein that Iris Murdoch portrayed education as an act of 'unselfing' – disrupting the egocentric rather than indulging it (Olsson, 2018: 164). Murdoch describes *unselfing* as 'awakened curiosity in the subject being studied', leading to

'greater interest in something other than oneself' – 'other beings and objects in the world' (Olsson, 2018: 169, 165). While using different terminology, there are clear echoes of Biesta's notion of subjectification in Murdoch's portrayal. However, Murdoch views this in more explicitly moral terms:

> By cultivating moral qualities, and the ability to consider the stories of others or to give careful attention to the things with which one interacts, the individual is increasingly directed towards what is good. (Olsson, 2018: 168)

For Murdoch, goodness is 'a refined and honest perception of what is really the case, a patient and just discernment of what confronts one' (Olsson, 2018: 168). However, the relationship between intellect and morality is not a straightforward one. The act of self-reflection often leads to a situation of greater understanding where a judgement needs to be made, hence its proximity to morality. As the reader explores the following subject chapters in this book it is worth reflecting on the sense in which they introduce children to ideas about what is good and the ways in which they cultivate qualities of judgement. Viewing education as 'decreasing egocentricity' explains why teachers must proceed carefully with the contemporary narrative to make *the curriculum* 'relevant' to children's everyday lives (which is different from making a pedagogical connection to pupils' prior knowledge) or to jump on the latest political bandwagon, such as banning plastic in schools. Such political narratives can be distinguished from induction into cultural norms because they are partisan and seek to change young people's attitudes and behaviours, and are thus a type of social engineering (Furedi, 2009).

Finally, we take note of an article by Zongi Deng (2018) who rightfully encourages social realists to say more about the educational task and its transformative potential. Deng draws together strands of thought from Germanic Bildung-centred didactic (see Von Humboldt, 2000) and the liberal education tradition, which he traces from the Chicago school of thought (Robert Hutchins, John Dewey, Richard McKeon and Joseph Schwab) (Levine, 2007). Unlike the polarizing Anglo-American educational traditions (child-centred versus subject-centred), European continental didactics is focused on the relationship between teacher, student and subject knowledge (Figure 2.1) (Hopman, 2007). In parallel with Biesta and Murdoch, Bildung refers to 'the formation of the full individual … through linking the self to the world',
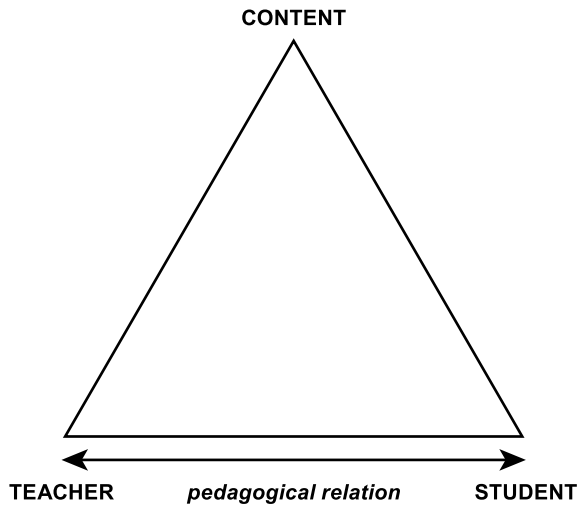
Figure 2.1   The didactic triangle (Hudson, 2014)

but also 'the cultivation of human powers, sensibility, self-awareness, liberty and freedom, responsibility and dignity' (Deng, 2018: 374). Again, this is about the development of the full individual through an engagement with intellectual and aesthetic richness, resulting in 'the concept of humanity in our person' (Lüth, 2000).

Deng notes much close correspondence between Bildung-centred didactic and liberal education, including the 'cultivation of human powers' derived from 'the methods or arts of inquiry embedded within the discipline' (2018: 376). Liberal education is more explicit in terms of providing intellectual and aesthetic experiences through which pupils can come to stand in a more objective position relative to their personal knowledge and opinions, thereby increasing autonomy. This necessitates 'cultivation of critical thinking, an ability to judge the validity and reliability of knowledge claims, and an understanding of the merits and limitations of a particular mode of inquiry' (2018: 377). While many an educationalist would concur with this ideal it is worth remembering that the cultivation of autonomous individuals is a social process realized through induction into disciplinary fields of knowledge. A common misunderstanding is to assume that the development of individual autonomy of reason and understanding means giving pupils control over their learning in the classroom. Rather, it takes years to develop the powers of judgement cultivated through learning a discipline. Disciplinary thinking is best nurtured through an intergenerational dialogue with a teacher who is an expert in their field as well as through conversation with

peers in an educational community. The pupil learns how the teacher reasons (disciplined enquiry) and gradually takes ownership of their ways of thinking until finally reaching the point where they no longer need the school teacher and they move onto a higher level of education.

Curriculum-making

Decisions about the content and structure of the curriculum and subjects take place at different levels. Subject-specific curriculum specialists should advise government, subject associations and examinations boards. This role is one of re-contextualizing or re-packaging disciplinary knowledge into a form and structure that is informed by pedagogical principles and the logic of the epistemology of the discipline. The job of individual subject departments in schools is to interpret the National Curriculum, decide which examination board to follow and select from the resources to be made available for teachers. Successful curriculum enactment depends upon subject teachers taking *ownership* of their curriculum – this means that *they* write their subject curriculum and schemes of work based on their interpretation of official documentation and tailored to the local context and the pupils in their school. This also points to the folly of schools importing off-the-shelf curricula.

The role of the teacher in 'curriculum-making' is to create a 'fruitful encounter' between the content and the learner leading to a 'deeper understanding of the world, modifications in perspectives and the cultivation of human capacities or powers' (Deng, 2018: 375). Deng directs teachers to five questions formulated by Klafki with a view to assisting them in this task:

1.   What wider or general sense or reality does this content exemplify and open up to the learner? What basic phenomenon or fundamental principle, what law, criterion, problem, method, technique, or attitude can be grasped by dealing with this content as an 'example'?
2.   What significance does the content in question, or the experience, knowledge, ability or skill, to be acquired through this topic, already possess in the minds of the children in my class? What significance should it have from a pedagogical point of view?
3.   What constitutes the topic's significance for the children's future?

4. How is the content structured (which has been placed in a specifically pedagogical perspective by questions 1, 2 and 3)?
5. What are the special cases, phenomena, situations, experiments, persons, elements of aesthetic experience, and so forth, in terms of which the structure of the content in question can become interesting, stimulating, approachable, conceivable or vivid for children of the stage of development of this class? (2000: 151–7)

While some teachers may be required to teach the National Curriculum and are directed by the content of GCSE and A-level qualifications, they still have much work to do to 'enact' the curriculum, creating meaningful learning experiences for their pupils. It is at the level of individual schools and classrooms that the curriculum becomes enacted – its form will be shaped by the educational approach of the school, as well as the character of the adults and children who make up the local community (Mitchell, 2019). As David Mitchell explains, curriculum-making involves the creativity and craft of the teacher, a task and a challenge that many teachers relish and gain professional satisfaction from.

The relationship between disciplinary knowledge and subject knowledge is one of re-packaging or, as Bernstein (2000) preferred, *re-contextualization*, within two spheres: the *official* re-contextualizing discourse (politicians, policy-makers, exam boards) and the *professional* re-contextualizing discourse (teachers' organizations, professional bodies, subject associations). It is from within the interplay of discourses operating within each sphere that teachers and curriculum advisers must make decisions about which aspects of disciplinary knowledge to include in the curriculum, how they should be presented and how the knowledge and skills can be best structured to allow pupils to achieve epistemic access and thus make progress in the subject.

Subjects will reflect the knowledge form (conceptual, aesthetic, ethical) and structure of the parent discipline, hierarchical or horizontal (see Chapter 1), and some will tend towards specialization (natural sciences) while others towards variation and diversification (history) (Young and Muller, 2016: 74). Subjects should be introduced to pupils in a simplified form, such that the messiness of disciplinary debates and divides can be introduced at a later, appropriate age. In the earlier stages of learning, pupils need a simple and coherent account of what a subject is and how it works, which should be reflected in the curriculum and policy documentation. Mimicking the discipline, subjects need a clear *purpose*, *object of study*, *organizing concepts*, *a structured framework*

of knowledge and *methods and modes of enquiry and practice* (Young and Muller, 2016), and are likely to reflect the logic of the discipline. This means that some subjects will tend towards *conceptual coherence* and others will have *contextual coherence* (Muller, 2012). While in universities the discipline tends to be exploratory and more varied in scope, schools need tighter and more logically coherent criteria for selecting knowledge based on principles of progression and epistemic ascent (Wiliam, 2013; Winch, 2013). It is only from such a foundation that young people can later be introduced to the complexities of intellectual debates and more diverse ways of thinking within or even across disciplines.

Drawing on a distinction made by Gilbert Ryle, sociologists of knowledge distinguish between two types of knowledge: *know-that* (propositional knowledge) and *know-how* (procedural knowledge). Subjects consist of both epistemic domains. Under the category of know-that we can also distinguish between *conceptual knowledge* (concepts, theories, laws and principles) and *contextual knowledge* (empirical data and facts tied to a particular context). As we saw in Chapter 1, most disciplines aim to move between the concrete – particular – and the abstract such that generalizations and theories can be derived, so what is important pedagogically is learning to move between the two.

Humans construct concepts in order to categorize and simplify reality as well as to describe the properties and behaviour of phenomena. Without them it would be impossible to make sense of the disordered reality that we experience at the level of perception. As Russian psychologist Vygotsky noted: 'with the help of the concept, we are able to penetrate through the external appearance of phenomena to penetrate into their essence' (cited in Derry, 2013). However, concepts do not appear to us in isolation and many are not necessarily easy to intuit. Rather we develop concepts in relation to other concepts, mother–child, light–dark, urban–rural, eustatic–isostatic, and our understanding of them deepens over time. That each new concept is inferred from existing concepts has important pedagogical implications for the classroom and is explored further in the work of Robert Brandom (2000). In fact, we develop whole systems of concepts for making sense of different aspects of human experience. As Michael Young observes, 'Subjects bring together "objects of thought" as systematically related sets of concepts' (2014: 98). As such, adds Young, they are the most reliable means we have of making sense of the world.

So, while procedural knowledge refers to the methods and modes of enquiry or practice, know-how is also applied to knowledge of the

inferential relations between propositions, as described above (Winch, 2013). Hence, pupils do not just need to learn concepts and propositions, but the 'learner must know how to do something with the propositions' (Young and Muller, 2016: 198). In other words, they must learn how to reason in the discipline – moving from personal and undeveloped reasoning to more objective and knowledgeable articulations.

Subjects must introduce pupils to the disciplinary-specific methods for testing and verifying theories and ultimately establishing new knowledge. In inducting children into humanity's intellectual traditions, we do not just want them to learn knowledge as something given, which just appears in a textbook, but as a product of human work and imagination. Hence, pupils need to learn how academics work in a given discipline: how do they approach their object of study, what type of questions do they ask, how do they collect data or evaluate a work of art, which means knowledge by acquaintance or enquiry. Methods and ways of working are specific to each discipline, although there is certainly an overlap between disciplines in common realms of knowledge (Moore, 2007). Scientists hypothesize and employ established field methods for collecting, analysing and presenting data, which are very different in the social and the physical sciences. Geography students need to learn how to interpret, use and make maps and Geographical Information Systems, as well as how to conduct fieldwork to collect, analyse and present data. History students should learn about the different types of questions historians ask and the circumstances in which to utilize them. And, they need opportunities to practise constructing historical arguments and to learn how to collect and use evidence and scholarly work to justify a claim. Mathematics students need to learn how to apply mathematical principles and reasoning to solve problems. This means learning how to employ different strategies, what to do when they fall short and how to carry out mathematical justification and proof.

Procedural knowledge has a particularly large role in aesthetic subjects where each work comprises an artistic unity, and generalization is achievable more by iterative interpretation than by application of concepts over a range of discrete phenomena. As pupils are introduced to a purposively selected range of exemplary works, their interpretive faculties are honed and they become more adept at making heuristic interpretations. These initial interpretations need to be rationally justified, *post hoc*, through analysis and comparison of a work's artistic form. Procedural knowledge in aesthetic subjects runs along two main axes. The first is knowing how to make, and articulate, comparisons

and appropriate judgements. This requires propositional knowledge of language as well as experiential knowledge (or knowledge by acquaintance) of reading, listening, looking at paintings and so forth. The second axis is that of making: pupils need to write, play and/compose music and make artworks. This requires propositional knowledge of the specific medium, exemplary knowledge and physical skills.

In each of the following chapters, the author explains how teachers can induct school pupils into complex scientific, philosophical, linguistic, mathematical and artistic ways of working, but in a simplified form that builds towards more nuanced and precise methods and thought processes. If pupils are going to achieve success and greater independence with a subject they will need to learn to skilfully combine concepts, context and procedures for intellectual enquiry.

Which subjects should schools teach?

In the introduction we outlined the aims for liberal education (well-rounded personal growth, reflexive thinking, intellectual standards and autonomy, capacity for related thinking) as well as the principles that inform a curriculum of general education (character of the student, universe of things to be known, common heritage of humanity, disciplines of knowing and creating). We also noted the distinctiveness of scientific, aesthetic and moral and the form these take in different disciplines. In order to shape well-rounded individuals a general curriculum should include subjects that introduce pupils to all three domains of knowledge. While we recognize the limitations of classifying subjects (including the absence of hard boundaries), we propose that a general school curriculum should comprise of arts, humanities (including foreign languages), sciences and mathematics. Different subjects each provide their own insight into different realms of human experience (Phenix, 1964), each of which have the potential to transform the child's understanding of and interaction with their surroundings.

The **arts** (literature, art, drama, music) present a unique challenge for epistemology and therefore, ultimately, for their re-contextualization as school subjects (Sehgal Cuthbert, 2019). Unlike other disciplines, their object of study – the phenomenon that has to be reconstructed and objectified as knowledge – is the perceptual, emotional and imaginative apparatus of human subjectivity (Cassirer, 1969, 1979; Langer, 1961). This is a very different sort of object from those upon which scientific, and social scientific, knowledge is constructed. While social realist

epistemology provides important theoretical insights and language for describing knowledge, a theory of knowledge in the arts requires a broader theoretical grounding to find principles of objectification and forms of evaluative criteria better suited to their epistemological identity. The role of aesthetic theories in providing a language of description is discussed in Chapter 1 and in the chapter on English literature, which also considers how aesthetics can provide helpful insights for pedagogic principles for language as well as literature.

Language has several purposes, communication being its predominant social function. Halliday (1973) describes the various developmental stages of language acquisition. Initially, spoken language in the mother tongue is acquired largely through immersion, which includes the range of familial and personal relationships of primary socialization. Schooling, however, requires introducing pupils to a more formal use of language, both orally and in terms of reading and writing. This linguistic 'break' from the automaticity of everyday communicative language facilitates pupils' ability to work in disciplinary knowledge-based subjects, which have their own, more specialized, vocabularies. As pupils progress through school they should be introduced to one or more foreign languages, so that they not only learn to communicate with people from other nations and deepen their knowledge of how language works but also gain some insight about which cultural meanings different languages may share and which are deeply rooted within a specific national community (see Chapter 7).

It is worth saying something about why we decided to focus on English literature, rather than English language. As the book is concerned primarily with the secondary curriculum, it is here where the emphasis shifts to learning language in a literary context. At secondary level, arguably, the purpose is to introduce pupils to the more sophisticated and complex language found in literature.

The **humanities subjects** (history, geography, foreign languages and religious education) explore the human condition and behaviour. While in the natural sciences concepts relate to naturally occurring phenomena, the objects of study in the humanities subjects are social constructs – language, culture, society, institutions, beliefs, practices, settlements, networks and communications. However, geography draws upon both social sciences (economic, politics, anthropology, demography) and natural sciences (geology, geomorphology, climatology) and hence is more difficult to categorize. History, geography and religious education have an integrative function, where the purpose is to synthesize meaning

from different realms of knowledge and experience. In religious education, for example, knowledge of beliefs, traditions and practices is drawn from both the past and the present. One of the aims of the humanities subjects is to broaden young people's conception of humanity through the study of how people live in different places, times, cultures and with different language and belief systems.

The **natural sciences** are concerned with matters of fact, moving from description to explanation. The physical sciences (physics and chemistry) aim for physical measurement and description of the world. Knowledge takes the form of propositions, sometimes expressed in mathematical form. Nevertheless, data are only the means to greater ends: the establishment of generalizations, laws and theories that describe natural phenomena and allow generalizable predications to be made. The aim is to bring order and intelligibility from apparent disorder. Biology is concerned with living matter or organisms. Biologists aim to identify patterns of organization of living things and to understand how they came into being.

Mathematics is a fully abstract discipline that exists independently of the outside world in that its objects of study are logical propositions rather than natural or subjective phenomena. Learning mathematics involves the acquisition of its forms, methods and theorems. The discipline is governed by internal logical consistency and procedure. Despite its abstract nature, mathematics has the potential to explain aspects of multiple real-world phenomena, such as weather patterns, the behaviour of materials or trade.

Schools (alongside the family and the community) also induct children into **moral norms** of behaviour both in practice and through the curriculum. Schools set their own standards and expectations of behaviour for both staff and pupils, which are often formalized through behaviour policies and actioned and enforced by teachers and other staff. In the curriculum, knowledge about morality is not usually taught as a stand-alone subject but is introduced to pupils through religious education, history, geography, philosophy, psychology and literature. Ethics can be learnt from lived and imagined stories in history and literature, as well as from contemporary situations and events. The essence of ethics is right deliberate action. While sciences are concerned with facts (what is), ethics involve deliberation of what is 'good' or 'right' (what ought to be). The language of morality is not specialized because ethical actions are part of everyday life and will be reflected in the school's policies, relationships and interactions with

pupils and parents. While we can make use of general, abstract moral principles, decisions are made in concrete existential situations, which need to be considered in their particularity.

There are other valuable subjects that schools teach which we have not included, like computer science, Latin, classics, politics, economics, physical education and technology. For the purposes of this book, our selection was to illustrate curriculum thinking in disciplinary-related subjects in the range of knowledge domains. Schools should be free to construct their own curriculum, such that it enables their pupils to explore different domains of knowledge and experience in their given setting. While we have organized the chapters of this book into specific subjects, we are not opposed to interdisciplinary curricular approaches, although we believe that to do this well depends on a firm foundation of understanding in the subjects being integrated.

It is not the purpose of this book to prescribe a curriculum for schools. Rather we are seeking to examine the importance of disciplinary knowledge and how a subject-based curriculum intersects with social knowledge and broader school aims. The chapters we have selected for this purpose are illustrative rather than expansive. Nevertheless, in each of the following subject chapters the nature of a particular area of disciplinary knowledge is explored, including its object of study, knowledge form and structure, disciplinary concepts, modes of enquiry, methods and procedures for verifying knowledge, and the pedagogical implications for teaching the subject to school children.

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3
English literature

Alka Sehgal Cuthbert

> *To have gone seriously into the poetry is to have had a quickening insight into the nature of thought and language; a discipline of intelligence and sensibility calculated to promote, if any could, a real vitality and precision of thought; and education intellectual, emotional and moral.*

<div align="right">(F.R. Leavis, in Harrison, 1970: 48)</div>

Introduction

The curricular journey of English literature in Britain's schools has not been a particularly happy one. From being 'a discipline of intelligence and sensibility' in the early twentieth century, today the study of literature in both academia and schools has fallen prey to a host of ills. One problem is a high level of fragmentation and incoherence in the literature curriculum. For example, in 2007 the exam syllabus specifications and structure of one British examination board offered a potential of 21,672 routes for the study of English literature over the two-year GCSE course. This made it 'theoretically viable for almost every candidate to have their own unique combination of prescribed texts' (Cambridge Assessment, 2008: 85). The replacement of modular by linear examinations in 2015 was, in part, an attempt to address this problem.

Unfortunately, this is not the only problem facing the study of literature at all levels of education. More recently, literature has become hostage in a culture war where one side sees little good in what is new and the other sees little good in the past. The creative relationship to past texts and criticism where 'tradition is not only a handing-down or process of benign transmission [but] is also a conflict between past

genius and present aspiration' has been lost (Bloom, 1995: 9). Too often the past is seen solely in negative terms, and contemporary texts are selected for their extra-literary features. Often this view is promoted by those who have strong political or social commitments, which they see as sufficient justification for intervening in the curriculum. This can lead to unfortunate controversies where there is a clash of home and school values, as illustrated in the example below.

In respect of Black and Minority Ethnicities, a video produced by Sheffield University in January 2020 claims that Shakespeare and Virginia Woolf appear on course lists because they are white-skinned. 'This doesn't necessarily mean that they're the ones producing the best work, rather that they simply better fit into an academic culture that's affected by the same racial biases that we see in the rest of society' (Turner and Somerville, 2020). The existence of a literary canon, in this argument, is seen to be little more than the existence of racist power relationships and signalling cultural superiority according to race. Whatever one's view of the decolonizing claims, they say little about the internal relations of knowledge in literature or about the role of the imagination.

Unfortunately, calls for decolonization of the curriculum/canon are not the only source of problems for English literature in the curriculum. In an extravagant flourish, Bloom (1995) provocatively claims that Shakespeare has been more central to Western culture than any philosopher from Plato to Wittgenstein. This *may* be true, but it is Kant, and the subsequent development of his aesthetics, that provide the intellectual resources with which Bloom's assertion can be supported with reasons intrinsic to literature. The central argument in this chapter is that current understanding of English literature in the curriculum is inadequate for realizing the subject's intrinsic *aesthetic* power. Instead it is more often valued for its potential as a carrier of either knowledge from other disciplines (e.g. history or linguistics) or as a means for effecting some extra-educational, often therapeutic goal (such as raising awareness of a political or social cause).

The chapter begins with a historical overview of the development of English literature as a school subject before moving on to a discussion of contemporary weaknesses in our understanding of language and literature as found in the National Curriculum of 2014 (with English and maths being introduced in 2016), and specifications and guidance from examination boards. The final section considers an aesthetic model of literature and the implied pedagogic approaches that could better realize its aesthetic power.

The development of school English in the twentieth century

English literature is a relatively recent discipline. In England, it was introduced into the undergraduate syllabus at Oxford University towards the end of the nineteenth century, but the selected texts were those of Old English. Its study was often incorporated with other courses, such as philology (Martin, 2012). In independent and private schools, the curriculum was based on the study of Latin and Greek languages and literature – not English. English language, in the rudimentary form of literacy, was taught in the elementary schools run by religious charities and associations, where texts were selected for their moral or patriotic messages.

By the early decades of the twentieth century, in the light of the experiences of the First World War in particular, a universal education system with English language and literature at its heart was taken extremely seriously among sections of the political and cultural elites as evinced in the Newbolt Report of 1921 and the Hadow Report of 1928 (Doecke, 2017; Sehgal Cuthbert, 2019). In criticizing the established practices of reading at the end of the nineteenth century as reported by the social critic, writer and school inspector, Matthew Arnold, the authors of the Hadow Report write:

> If some of the children in the end could recite whole pages, they had too often neither enriched their own powers of expression, nor caught the spirit of the books which they read, nor even mastered the information which the authors sought to convey. (Hadow Consultative Committee, 1928: xvi–xvii)

English language and literature, in which contemporary human experience was valued, gained wider purchase as a means for establishing a common culture. This meant they were seen to be central in the curriculum of Britain's post-war education system. The concept of English as common experience and culture is found in the work of F.R. Leavis, who lectured at the newly formed English Department at Cambridge University in 1927. The literary context was one of lively public contestation regarding Modernism in literature and whether literature, and culture more broadly, was to be a motor for a broader idea of progress and renewal. It was a period where, across Europe, artists and writers launched manifestos and magazines.

Leavis was highly prolific as a public intellectual and an educator, which differentiated him from the more insulated circles of the Bloomsbury set. He wrote test papers and compiled reading lists for grammar schools wishing to send pupils to Oxbridge (MacKillop and Storer, 2005). The study, *and experience*, of the text was central to the practical criticism developed by him and I.A. Richards, whose *Practical Criticism: A study of literary judgment* was published in 1930. Like the contemporary poet T.S. Eliot, Leavis was keen to put the text rather than the life of the writer on centre stage – something they saw as an unwanted leftover from Romanticism. Practical criticism was the dominant approach of school English for much of the post-war social democratic era. As an approach, it proved flexible enough to use whether books were chosen according to themes, genres or individual authors. It informed English teaching across both grammar and secondary modern schools, although forms of assessment differed according to the type of course studied (O levels were wholly essay-based exams, while CSEs contained components of coursework).

Growing confusion in the English curriculum

For various reasons, by the late 1960s, the Leavisite approach to English literature was being questioned, not least because of Leavis' apparently arbitrary, or under-theorized, judgements over what should, and shouldn't, be in the canon (Kaul, 1996). Increasingly, the practical criticism approach to literature was questioned and different approaches to literature and its study emerged. In academia, the focus on individual texts central to practical criticism was seen by some as lacking systematicity. The rise of structuralism attempted to systematize the rules and grammatical structures of literary language in the manner of linguistics. Socio-linguistic theory brought insights into the developmental stages of language and its various social functions. Schools, however, began to move in the opposite direction to academia where theoretical approaches proliferated.

If academia saw Leavisite English as naive or unscientific, some sections of the teaching profession saw it as something arcane and removed from everyday life. English literature reading lists began to be marked by a shift away from canonical texts and practical criticism, and towards studying almost exclusively modern texts, and extracts, through mainly discussion/debate-based lessons. More non-fiction contemporary texts, which now included newspapers, magazines and

other texts from popular culture, were chosen for their extra-literary themes and used primarily as springboards for discussion and debates about specific social and political issues of the day (Abbs, 1994). A similar reframing of writing in English lessons also occurred over the same period. For example, at the 1966 Dartmouth Anglo-American Conference in English, there was a heated debate between those, including John Dixon, who argued that pupils' writing needed to be more personally authentic and spontaneous, free from conventional rules that allegedly stifled pupils' creative potential, and those who felt that creativity required the rules of language and exemplary models of canonical literature (Allen, 1987; Sublette, 1973).

Furthermore, to validate pupils' personal writing as more authentic or truthful than that of established writers is to ignore the fact that memory, fantasy and actual experience often co-mingle in children's minds for a long time. Their ability to differentiate levels of experience and reality is not given fully developed at birth. The debate centred on what role literary and language traditions were to have in schools both for reading and as models for writing. Leavis noted (critically) that the contemporary cultural preoccupation with childhood presupposes that children's spontaneous creativity was not to be 'corrected by the authority of a "tradition" to which the artist sacrifices himself' (Coveney, 1967: 22). Around the same time, in a sociological tenor, leading academics at the Institute of Education, University of London, discussed the implications for education of the loss of authority of traditional rites of passage among adolescents (Bernstein et al., 1966). Their somewhat pessimistic conclusion was that schools could only focus on their role in intellectual development and give up on traditional, broader aims of inducting the next generation into social norms because teenagers were creating their own norms. Tradition, whether in relation to the norms of curriculum, pedagogy or conduct, began to be increasingly negatively interpreted by a younger generation of teachers in an expanding education system.

Moore (2007) explains that from a sociological perspective curriculum controversies often happen when there is a quantitative and/or qualitative change in the pupil cohort. The 1960s and 1970s was a period when school provision was expanding through the establish-ment of comprehensive schools and raising of the school leaving age to 16 in 1972. In short, there were more working-class pupils staying on for longer in schools. For some educators, this created certain anxieties. For example, Leslie Stratta, a co-editor of the *Reflections* textbook, wrote in an article 'Language and experience':

> Reading, especially of literature, presents all pupils with a number of problems. Books are frequently long or longish, the language used, especially of poetry, is often dense and difficult, more so if the work is from the heritage, the vision of life presented comes from the mature imagination of an adult mind. (Stratta, 1972, cited in Abbs, 1994: 143)

No doubt teachers faced new and sometimes formidable problems arising from wider cultural, institutional and political developments. But the idea that out of the vast possibilities of existing literature and poetry, whose aesthetic qualities have been tested and established, suitable literary content could not be found from which to construe fresh courses in the study of literature is hard to sustain. The negative evaluation of presenting the young with 'the vision of life … from the mature imagination of an adult mind' speaks to the loss of self-confidence on the part of adults who, in their professional roles, had previously been seen as, and, perhaps more importantly, *saw themselves* as, sites of pedagogic authority.

For Abbs, abandoning English literature as 'a distinctive symbolic discipline' in favour of 'general processes of learning through language' is 'a positively philistine position, a disturbing act of cultural abnegation' (1994: 143). He acknowledges that important gains were made, such as greater awareness of the internal symbolic ordering of language and the importance of discussion, but overall, he concludes, they were relevant to 'process and pedagogy' (1994: 143) and came at a cost, 'What was tragically excluded was any sense of a unique symbolic order characterizing English, any sense of the intrinsic awareness of the vast field of literary creation' (1994: 144). It is ironic that this intellectual defeat, or retreat, in curriculum matters occurred at the same time as, institutionally, education was becoming close to universal. More working-class pupils were in school, but the education they were to receive, at least in literature, was being revised in ways more likely to corrode than enrich. One could ask whether a similar sociological dynamic is not in play today but in relation to pupil cohorts differentiated along lines of ethnicity rather than, or in addition to, class.

Current weaknesses in the curriculum: Language

In 1988, under a Conservative government's radical agenda for educational reform, Britain's first National Curriculum was introduced.

In the ensuing controversies, especially over the English (and history) curriculum, rigour was glossed in ways that left little room for either the Leavisite or the more child-centred concepts of experience. Neither was there much scope for the professional autonomy enjoyed by teachers in general. English language came to be more closely associated with linguistics and literacy, perhaps reflecting the influence of earlier developments in academia. Initiatives such as Knowledge about Language and Language in the Curriculum were accepted by some teachers on the basis that such initiatives might raise the status of English teachers because this was systematic knowledge (Carter, 1994). The Labour government's introduction of the National Literacy Strategy in 1997 shows that this approach to language was supported by both political sides although their reasons may have been different.

Another consequence of these developments was to further entrench the separation of language and literature, and the primacy of a narrow conception of language over literature. As language came to be more closely associated with literacy, and literacy levels with social mobility, attention to literature fell by the wayside. The legacy of these developments continues to inform curricular English today. For example, the current National Curriculum for English at primary level contains extensive lists of grammatical techniques, phonic patterns and spelling rules that are to be taught to the youngest pupils at Key Stages 1 and 2. The overly analytical, linguistic approach has been rightly criticized because it:

> fails to see that the way children learn to do things as complex as to read with fluency and understanding, to write correctly and to speak and write grammatically is *not* the way that adults, already competent in these things, find it most enlightening to analyse them abstractly. (National Association for the Teaching of English, 2016: 3)

Even in the mid-twentieth century, some educators had a more psycho-logically and educationally sophisticated understanding of grammar. Pamela Gordon, for example, writes on teaching grammar:

> We begin … not by learning the parts of a sentence and then learning how to put them together, but by the process known as *syncretism*. We form a schema, or impression of a whole which we gradually learn to dissociate. Synthesis is the first process and analysis is the second. (1946: 76)

Gordon's account of syncretism has affinities with Crowther's theoretical account of imagistic or perceptual concepts discussed in Chapter 1. Adults are adept at giving and understanding abstract definitional statements; children are less so. For example, explaining the grammatical concept of a collective noun through different concepts such as 'a group of items' or 'when a group of items/nouns are all together' merely introduces more linguistic definitions: it does not convey or promote internalization of the concept (deeper understanding) to children who lack sufficient experience of conceptual thought. Drawing flocks of birds or a shoal of fish may help some pupils struggling with wholly linguistic definitions; but for a few, the visual image is still insufficiently concrete, and they remain insecure in their understanding of the difference between collective and plural nouns.

One pedagogic approach we could construe from aesthetics is the need for concrete examples, carefully chosen for their capacity to embody conceptual meaning. For example, in relation to collective nouns, a demonstration with a bunch of grapes allows pupils to *visually* grasp the concept of what constitutes the collectivity of 'a bunch' of grapes. The conceptual distinction between 'bunch' and 'grapes' is reinforced when the grapes are picked off the bunch. The plural noun 'grapes' is still there, but the more abstract concept of the collective noun, 'bunch', is not.

The example illustrates how insights from aesthetics can be a rich resource for teachers of English. They can contribute to a pedagogic repertoire to help prompt pupils' deeper understanding of abstract concepts of grammar, or other abstract concepts from other disciplines. Aesthetics highlights a human-centred hermeneutic dimension of teaching that can be overlooked in accounts informed more by cognitive science or behaviourism.

Current weaknesses in the curriculum: Literature

In contrast to English language, where the content in the primary National Curriculum is tightly prescribed, the model of English literature at secondary level seems indeterminate and arbitrary. If we look at the selection of set texts and the type of questions found in GCSE examination papers taken at the age of 16, different approaches and models are discernible. These include personal expression, linguistic analysis and literature as cultural heritage/social reform (Sehgal Cuthbert, 2017). It is striking that the GCSE set texts lists for the exam

boards offer a very limited range of modern prose. Most lists leap from *Animal Farm* (1945) and *Lord of the Flies* (1954) to novels mostly from the 2000s. The latter group range from Nobel Prize winner Kazuo Ishiguro's *Never Let Me Go* (2011) to the debut novel *Anita and Me* (1996) by comedian/actress Meera Syal (Shurville Publishing, 2018).

The latter text features on the lists of four out of five exam boards: in three instances it is placed under the category of modern text prose, and in the Welsh Joint Education Committee (WJEC) board it comes under the awkwardly named category of 'Different cultural prose'. Strangely, there are very few offerings from the intervening decades, with only the Council for Curriculum, Examinations and Assessment (CCEA) list offering Harper Lee's *To Kill a Mockingbird* from 1960. There are few signs of any underlying principle at work in compiling the lists, and the selection of books to be studied, the heart of literary study, seems arbitrary. Certainly, it is hard to find public justification for the selection. It is not clear, for example, why *Anita and Me* is a set text, except possibly as a nod towards multiculturalism or as a tacit form of differentiation of texts to meet differences in perceived abilities and/or interests of pupils.

In academic and some professional circles an over-theoretical approach to literature continues to be influential. For example, Atherton et al. write:

> We recognise the central importance of students voicing personal affective responses, but believe that in order to develop as nuanced and reflective readers it is essential, in the tradition of critical literacy, to bring critical and analytical understandings to bear, in order to make sense of the political, aesthetic and theoretical principles that underlie and enhance such personal responses. (2013: 2)

The authors' focus is on English literature for 16–19-year-olds, who, they think, need discussions of 'class, gender, sexuality and race in society' (2013: 130) in preparation for the study of Marxist, feminist and postcolonial perspectives at university. While critical perspectives might be suited for some university courses, it is highly problematic when applied at the stages of compulsory education. Maybe some A-level students do have the wide, deep and rich reading experiences that would be needed prior to the application of any critical literacy lens. But it seems rash to assume that most candidates would, especially given the limited range of texts in the implied curriculum at GCSE level. To apply any theoretical lens to literary texts too prematurely ignores, or marginalizes, the 'personal, affective responses' the authors claim

have central importance. Personal response becomes something to be uncovered for alleged political undergirding rather than being explored and developed to arrive at deeper, more nuanced judgements.

The following example illustrates the distorting or reductive effect that can arise from studying literature through the lens of critical literacy in the classroom. In *To Kill a Mockingbird*, the point where Atticus kills the rabid dog is a significant moment in terms of plot, theme and character development. Complex layers of meaning are interwoven: Jem and Scout's developing relationship with Atticus; Atticus as a man of action as well as of thought; and differing perceptions of bravery and/or manhood. The material is replete with interpretive possibilities. Yet a popular pupil guide, sometimes sadly also used by inexperienced or unconfident teachers, offers the following commentary:

> In a larger symbolic sense, the dog, because it has rabies, is a dangerous threat to the community. In shooting the dog, then, Atticus is trying to protect the community from its most dangerous elements. Similarly, in defending Tom Robinson, Atticus tries to protect the community from its most dangerous, racist tendencies. (Sparknotes, 2020)

While racism is a major theme in the book, to impose a supervening theme of racism on every narrative event, with little or no textual support, not only reduces the scope for interpretation, it also ignores what *is* in the text. There is considerable textual evidence in the book to support the claim that far from being within the community, the Ewells and their 'racist tendencies' are clearly *outside* Maycomb's normal social and ethical community. There is little to support the conclusion that there is a direct symbolic relationship between the rabid dog and the racist community as the guide implies.

The moral and thematic complexities of this narrative event are obscured, or ignored, by the guide's commentary, which, under a lens of critical literacy, presents it as a simplistic anti-racist homily.

Other examples of de-centring the text in literature are found in material that encourages teachers to locate literary meanings within everyday social experience. One popular educational blogger and English teacher, for example, in a worksheet for *Romeo and Juliet*, asks pupils to consider whether Juliet's mother is really concerned about Juliet's well-being. The tension between the passions of youth and the experience of age, or the character of social norms, or how the language itself delineates the characters, is lost (the class lessons may have

included this, but if so, it is not reflected in any of the numerous worksheets offered online). The given extract is reduced to a metaphorical mirror that places pupils' direct responses at the centre and fails to subject that response to fuller interpretation and judgement, without which it is hard to go beyond personal opinions. The problem is not one confined to individual teachers. Weak disciplinary framing of literary texts also appears in questions on Foundation-level GCSE English literature papers (Sehgal Cuthbert, 2017). Instead of extending and deepening spontaneous personal responses through the experience of literature, literature is used to illustrate a ready-formed opinion or as a sort of therapeutic prompt. Both are antithetical to an aesthetic understanding of literature, to which I now turn.

An aesthetic way forward

Aesthetic theories of symbolic representation provide resources from which it is possible to construct a model of literature that avoids the main pitfalls of critical literacy approaches (which tend to ignore the text itself); cultural restoration/change approaches (which consider text as either embodying social order or a tool for its change); and personal response alone (which tends to ignore the text itself but for different reasons to critical literacy approaches). The aesthetic, however, is a difficult concept to apply to the secondary curriculum. The fact that formal national assessment can only test what is empirically observable obviously poses a problem for aesthetic disciplines where the element of subjectivity is so central. In this respect, the removal of coursework from assessment in English literature may be exacerbating a tendency to focus on techniques, whether linguistic or literary. The problem is compounded because of the inordinate influence of examinations on curriculum and pedagogy.

As Michael Young and Johan Muller (2016) point out, no *specialized* knowledge or language is needed for someone to aesthetically appreciate a painting, music or literature, which cannot be said of physics or geography. But this does not mean there is no specialization going on in aesthetics. However, it does mean that the principles of specialization, or the markers of knowledge progress, are not so readily identifiable or open to systematization as their counterparts in hierarchical knowledge structures. A brief comparison is illustrative. Let us take the following mathematical sentence: $2 + 3 = 5$. There is little room for variation in terms of sequencing: provided the function symbol is a '+' then the

numerals '2' and '3' be could be placed in the reverse order without changing the sum of '5'. If the function symbol were changed to '−' instead of '+', then the order of numerals loses this flexibility; it cannot be reversed without altering the difference. In both cases there is only one answer that meets the criteria set by mathematical logic and arrived at by applying narrowly stipulated rules.

In contrast, an example from literature illustrates how the process of making meaningful judgements is fundamentally different from mathematics:

> Season of mellow mists and fruitfulness
> Close-bosom friend of the maturing sun

The famous opening lines of Keats' *Ode to Autumn* (published in 1820) provide a sensual evocation of autumnal weather. But unlike lesser poems on the same subject, Keats' poem is also an *embodiment* of his personal subjective experience of autumn, and all that it means to him, in the material of literary language. The lines are more than a description of autumn's empirical features; they are also more than an explicit declaration of his feelings in quotidian language. His sensory perceptual experience of autumn combines with other contents of his subjectivity, including thoughts about universal, existential questions.

Perhaps uniquely, in aesthetic subjects, the subjectivity of the reader/audience/pupil, as well as the artist/author, is integral, and not only in relation to the general motivation to learn. It plays a constitutive role in the knowledge itself. This, however, still leaves us with the problem of how a direct personal response/experience, such as that advocated by Dixon discussed earlier and others, is different from an aesthetic response/experience. It also leaves us with the problem of how to judge quality in a specific work of art.

Aesthetic experience in literature

Wolfgang Iser's reader response theory proposes that the interaction between text and reader is the space for aesthetic experience: it does not exist in the text itself or in the personal response alone (Deneau, 1980). Literary texts, Iser argues, work through *the lack* of coalescence between four important textual perspectives: narrator, plot, character and implied reader. The gaps are the catalyst for our imagination to move from reproductive, everyday mode to a more specialized productive mode as

the reader recreates the diegetic world internally. He writes, 'Now if the reader and text are partners in a process of communication, and if what is communicated is to be of any value, our prime concern will no longer be the meaning of that text … but its *effects*' (Iser, 1975: 7). If successful, these *aesthetic effects*, rather than representational meanings, are what allow readers to enter the diegetic world of the text (Iser, 1978; Rosenblatt, 1987). Note he is not saying the text has no meaning, but rather the meanings are not exhausted by comprehending the propositional language alone.

Iser makes a strong case that literature does not present, or re-present, empirical reality, but instead it is a way of telling us something about reality. If we consider this claim alongside Kant's and Cassirer's explication of aesthetics (see Chapter 1), we can infer that what all (successful) works of art tell us is that human subjectivity, and our power of imaginative symbolizing in particular, is the originating *source* of meaning: without it rational, concept-based knowledge would remain inert and unable to be internalized. One does not have to accept all of Bloom's claim that 'aesthetic criticism returns us to the autonomy of literature and the sovereignty of the solitary soul, the reader not as a person of society, but as the deep self, our ultimate inwardness' (1995: 10–11) to accept his point about developing inner resources.

Literature as artistic symbolic form is different from other art forms because it possesses no sensual material mass of its own (unlike painting, sculpture or the sonic waves of music). In so far as it has a material substratum, it is the written and spoken linguistic system shared by a linguistic and cultural community. In horizontal discourse of everyday life (see Chapter 1), language functions mainly as communication and is the means by which we conduct our social interactions. The spoken and written word, in aesthetic mode, is better able to convey 'the general movements of consciousness rather than its particular contents' (Buesch, 1973: 526). Hence, when reading a poem or a particularly poetically written novel, we can feel as if we have had an experience of something we cannot quite explain. This element of self-reflexivity enables us to be made conscious of our own consciousness. Where propositional language, the language of the sciences, presupposes a relation of distance (physical or conceptual) between the subject and object of knowledge, poetic language presupposes the opposite – an identity between the subject and object of knowledge. The linguistic and abstract conceptual tools we use to grasp the physical and social aspects of reality are unable to be as successful in grasping important aspects of consciousness itself. And consciousness is where all experience and

concepts are cognized. This is the role of aesthetics, and in literature, poetry is its highest expression.

Although poetry shares the same linguistic substratum as everyday language, the meanings of the latter could be paraphrased while those of literary language cannot (Hough, 1963). Consequently, literary, or aesthetic, meanings are better evoked through the prosodic features, structure and rhythms of language as well as its explicitly stated representational content. When reading literary texts, meanings develop, intensify and can be reversed, as we progress through the work. There is a constant iterative process where part is compared to the whole, and the whole is shaped by the parts. To change a single item of vocabulary, grammar or punctuation would substantially affect the work's aesthetic meaning (McGilchrist, 1982).

By way of illustration, compare the following two lines. One is from the second stanza of Keats' *Ode to Autumn*; the other is a paraphrase of that line:

1.   The winnowing wind softly lifted her hair
2.   Her hair soft-lifted by the winnowing wind

Even if you do not know the poem, if you say the lines aloud, you will probably be able to judge which is the original line from the poem. The rhythm created by the specific organization of words and the use of hyphenation, the movements of the mouth and tongue as we enunciate and the prosodic effects of the external or internal voice all combine to evoke sensory experience. The choice of 'winnowing' resonates because of the word 'granary' in the previous line, and both strengthen the rural metaphor. The sensual aural and verbal *experience of the poem* is prior to, and independent of, any literary analysis of ostensive and metaphorical meanings or linguistic analysis. This does not mean pupils require no guidance, but the guidance is to help them enjoy the sensuality of the language and its *evocable* meanings prior to more analytical study. For example, even very young pupils could enjoy guessing the season by practising reciting the opening lines of the poem. In guiding them to attend to the rhythm and prosodic effects, as well as key concepts of 'fruitfulness' and 'close-bosom friend of the mellowing sun', they can infer connections to the season of autumn. In this way young children can enjoy a first-person experience of a complex, canonical poem that might be lost if too much biographical or contextual knowledge was provided before even reading it.

The difference between an aesthetic reading and an analytical or personal reading is that with the former the reader's response is in a

continuous tracking relationship with the text itself as an aesthetic whole. In the latter, the text's representational content is treated as a prompt for a response or analytical treatment that then becomes the focus of attention with the text itself firmly in the background. Direct opinions are a starting point only, not an end point; linguistic or historical analysis should embellish or refine, but not substitute, the aesthetic experience. Given the complexity of aesthetic reading, where an hour-long lesson may be well spent on the first two lines of a worthwhile poem or novel, there is a legitimate question to be asked whether, at school level, reading and interpretation may be sufficient; critical and linguistic analysis may be best left to higher levels of study.

The aesthetic model and approach to literature outlined here runs counter to some widespread contemporary trends. For example, a narrow reading of E.D. Hirsch, popular among some of today's knowledge supporters, encourages providing pupils with a lot of contextual knowledge and vocabulary before reading. The aim is to ensure no pupil is disadvantaged through lack of cultural capital; but this strategy risks explaining the meanings away as suggested above. Prioritizing comprehension when it is conceived in technical ways of decoding that rush to explanation and analysis risks dulling the imagination that drives aesthetic reading. Aesthetic interpretation is a largely under-theorized concept and barely present in much current curriculum discourse. This is an educational loss.

The question of quality and judgement

Kant (1914) writes of the importance of aesthetic judgement on a standard of beauty, which is akin to recognizing some standard of truth. Aesthetic judgements prompt the individual to seek the assent of others, or if they are not in agreement, to provide alternative judgements. In this sense a judging community is both assumed and established in the process of making judgements. The possibility of a shared response that drives aesthetic interpretation and judgement brings aesthetics into the realm of history and society rather than being limited to the domain of individual psychology. When making a judgement, reference to the text – knowledge of where the text stands in literary traditions (is it a superlative exemplar of established generic conventions or an iconoclastic original, for example) as well some knowledge of the literary debates and criticism – is needed to turn personal opinion into aesthetic judgement (Moore, 2007). Crowther (2007) argues that style in art is the

articulation of the creator's subjectivity and artistic intentionality: not all examples of a great artist's or author's works may be successful, but those that are are generative. Peers or subsequent individuals continue and refine, develop, or radically alter features of great works. Shakespeare's *The Tempest,* for example, has generated further interpretations across centuries, from Robert Browning's poem *Caliban upon Setebos* (1864) to Aimé Césaire's *Une Tempête* (1969). Those with power to choose curriculum content in literature should be at least conversant with these ideas, from which principles for selection could be agreed.

At school level, teachers could choose from a range of organizing principles for selecting texts, e.g. genre, feminist. They could also order their selection thematically, e.g. modernity and traditional values. Within this thematic and comparative approach, books from a diverse range of cultures, from Achebe's *Things Fall Apart* to Lampedusa's *The Leopard*, could be included. This means English literature could encompass texts written in English, *and* those with good translations, rather than only books originally written in English. The aesthetic quality of texts garners some freedom from meanings being tied only to specific cultures rather than the universality of individual experience (although this will be possible with some texts more than others). This approach requires closer conversations between representatives of the school subject and those developing literary criticism at the disciplinary level. It also requires curriculum-makers and English teachers to be familiar with a wide range of established and more recent literature.

After the selection stage, pupils need to be introduced to a preparatory, related process of justifying their responses in the light of what is in the text through carefully guided classroom discussion. In this process, pupils learn to better differentiate and assess different types of truth claims and also experience something of what is entailed in making one small (but important) part of the world meaningful: their subjective experience begins to be differentiated between personal direct response and something more public and universal in that it evokes, and engages with, the subjectivities of others (including those of authors who may be long dead).

Conclusion

Writing in the first half of the twentieth century, Wilhelm Furtwängler (1989) and Virginia Woolf (2003) recognized that the existence of a judging *public* was important for two reasons. Firstly, a stronger

relationship between critics and an interested public contributed to improving the quality of criticism, which in turn could shape wider public taste. Secondly, such a relationship contributed to a more fertile and hospitable culture for artists whose work pushed at the limits, or broke, certain established artistic conventions. The aim of a literary education in schools is to prepare pupils for their future roles as part of such a judging public. A literary canon is essential for this public task because it affirms the central aesthetic differentiation of experience. Unfortunately, the current literature curriculum seems ill-equipped for this task for reasons discussed earlier.

The canon is not set in stone, and its contents are revisable as literature itself develops; new genres and unearthing of previously unknown or neglected works can be included. This can enrich and expand the choice from which the school literature curriculum can be constructed. The crucial criterion is that the selected works, for both canon and curriculum, should exhibit aesthetic quality as discussed here. There is no reason to suppose that *only* works by white men of the West have aesthetic value; the aesthetic, like reason, is a faculty common to all people *qua* humans. By all means we can call for a review of the current curriculum, and we can enrich the curriculum by extending our search to works from other cultures or that encompass fresh perspectives (although there are potential technical problems of translation as well as difficulties posed by the relationship between language and culture). Derek Walcott's *Omeros* (1990) is a superb example of an epic work that draws on the lyrical qualities of Homer's poetic works to create a startlingly fresh and profound interpretation that speaks to the past of ancient Greece as well as the imageries of a modern postcolonial world. The conversation that is literature can encompass many interlocutors, but we must insist that the selected literature is, first and last, aesthetic and that its teaching acknowledges this hitherto neglected dimension of knowledge.

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Suggested further reading

Do not be put off by the fact that Halliday is a guru of socio-linguistics. For a really clear account of language development and its implications for pedagogy see: http://lchc.ucsd.edu/mca/Paper/JuneJuly05/HallidayLangBased.pdf (accessed 8 September 2020).

The following is a great opinion piece by reading expert Henrietta Dombey: http://booksforkeeps.co.uk/issue/169/childrens-books/articles/other-articles/what-happened-to-england's-national-literacy (accessed 8 September 2020).

For a really good account by a teacher unafraid to exercise pedagogic freedom in teaching literature when rejecting the use of a prescribed technical template for teaching, see: https://usercontent.one/wp/www.literaturedaydreams.com/wp-content/uploads/2020/05/Lou-Enstone-PEE-Article.pdf. For those interested in a lovely read, in everyday language, about children's language development, see David Crystal (2017) *Making Sense: The glamorous story of English grammar*. London: Profile Books.

4
Art
Dido Powell

> *In art, progress does not consist in extension, but in knowledge of limits.*
> *Limitation of means determines style, engenders new form, and gives*
> *impulse to creation.*
>
> (Braque, 1975)

Subject knowledge in art encompasses three major challenges for teachers: firstly, how to teach practical craft skills and their relevant applications; secondly, how to encourage pupils to use techniques according to objective procedural knowledge and rules, enabling them to express subjective experiences through the manipulation of forms and colours. These skills depend on teaching pupils how to see. This involves a specialized vision, described by Roger Fry as 'pure vision abstracted from necessity' (1937: 30). Edgar Degas, for example, explored drawing as a way of developing specialized vision by viewing familiar forms from odd angles – from above, below and close-up.

Thirdly, teachers should introduce pupils to the relevance of historic and contemporary contexts in the production of art. Ideally, these frameworks should provide guidance within limits and a route for self-expression. Henri Matisse, the twentieth-century painter, explained that the 'entire arrangement of my picture is expressive' (Harrison and Wood, 2003: 70), stressing that the placement and shaping of every form and colour played a role and that when a composition is harmonious nothing could be moved without harming the work's expressive power. Pupils need to know how to make an artwork, what art objects are, and how and why they are produced and valued.

The present system of delivering a course and assessing art at GCSE level focuses on the acquisition of the formal elements of a visual language as well as an acquaintance with historical and contemporary

works of art and craft. Pupils, as part of their exam, are required to show evidence of research into a well-known artist's works through written and visual responses presented in sketchbooks. The research is a preliminary step towards the creation of their final piece of artwork. This investigation is, however, unsupported by a programme of art history teaching; consequently, pupils tend to present brief biographies on artists accompanied by painted or drawn copies of enlarged fragments of artworks in a formulaic manner. This approach sidesteps an analysis of the meanings and intentions behind those works. Of course, some teachers may include aspects of art history or criticism, but it is not required to be taught as a compulsory part of the art or the art and design curriculum as stipulated in major exam boards or government guidance. It is an approach that removes the quoted artist's work from its artistic context, especially the relevance of stylistic techniques, and imposes a prescribed narrow framework for pupils' visual expression.

In his analysis of the Assessment Objectives (AOs) in the 2004 GCSE Art Syllabus Specifications, Leslie Cunliffe (2005) exposes a confusion between procedural and propositional knowledge. Unit AO 1, for example, requires pupils to 'develop their ideas through investigations informed by contextual and other sources demonstrating analytical and cultural understanding' (Cunliffe, 2005: 200). There is, however, a limited explanation of the procedural or propositional knowledge needed to underpin artistic language. The specification's lack of clarity in describing both forms of knowledge makes the technical suggestions appear disconnected and arbitrary, rather than explaining a coherent line of practical or conceptual progress.

The drawback of a muddled, or underspecified, syllabus is then exposed in the pupils' sketchbooks through superficial references to known artworks, resulting in a visual uniformity in the layout of the sketchbooks between weaker and more talented pupils. It is a method that dilutes individuality in the responses and glosses over the relationship between style and content in artworks.

Since I wrote this, in 2017, a new A-level art history has been introduced by Pearson Edexcel. It has widened the scope of Western art history to include Non-European art and architecture within the categories of the themes: Identity, Nature and War in art (as well as two compulsory historical periods of Western art). All questions are compulsory, and pupils have to write about one non-European building, such as the Lakshmana Temple, Khajuraho, Madhya Pradesh, India; a sculpture, such as the Benin Bronzes, Benin, Nigeria; and a painting. Ironically, the non-European categories themselves reflect the legacy of a

Western bias through the compulsory inclusion of the category 'Painting', which excludes artworks from cultures in which painting was not a traditional art form.[1]

Though the new specification is a welcome advance that aims to introduce students to magnificent buildings and art outside of the Western canon, it is impossible to develop anything more than a cursory understanding of the cultural contexts of the works within such a broad syllabus. A summary of the specification reads:

> This course develops students' understanding of the relationship between society and art; art historical terms, concepts and issues; the influence of cultural, social and political factors, as well as developments in materials, techniques and processes of both art and architecture over time. (Edexel, 2017)

There are four major approaches here: cultural, art historical, critical theoretical and formalist. This would require an extraordinary amount of substantive knowledge of teachers, and with each approach left implicit, the specifications provide little guidance for teachers.

In this chapter I propose that knowledge of art history should be an integral part of the art syllabus at GCSE level. Importantly, it should be integrated with the practice of looking at actual examples of art. In this way, a dichotomy could be avoided between teaching history of art with little or no experience of art and looking at art with little or no background knowledge of its history. The aim is to introduce pupils to wide sources of knowledge to avoid the superficial quoting from artworks. I suggest that an in-depth study of artworks in which techniques are explained in relation to intentions and influences would encourage self-expression by demonstrating the varied subjects and stylistic forms that artists have developed to convey their ideas, beliefs and emotions.

The separation of art and history of art as distinct subjects at A level, and its absence or minimal presence at GCSE level, not only deprives pupils of the analytical skills, facts and the language to understand art; it also jars with contemporary art practices, which since the creation of Abstract Expressionism in the 1950s have come to rely increasingly upon the relationship between the practitioner and the critic to explain complex works to the public – works that do not reflect known, traditional figurative styles.[2]

Pupils need to be introduced to making analytic judgements, which relate to forms, compositions and techniques demonstrated in individual works, and synthetic judgements, which apply to the detection

and linking together of similarities in style between works from the same era. These interpretive artistic judgements require both empirical and theoretical knowledge, and the history of art can contribute enormously to help pupils achieve this aim.[3]

The making of art and the historical meanings of artworks will be analysed in this chapter through addressing selected works, to demonstrate how knowledge in art can be acquired both explicitly and implicitly. Artworks for discussion will be chosen from the periods of the Renaissance in the early fifteenth century, Romanticism of the early nineteenth century and Modernism of the early twentieth century. An in-depth analysis of artworks based on accumulated evidence would help to demystify art by explaining the links between methods and intentions. This knowledge would foster confidence in the value of individual expression. According to the art historian Ernst Gombrich: 'There is really no such thing as Art. There are only artists' (1973: 4).

The centrality of the individual in art, as both a subject and an interpreter of our cultural practices and our relationships with nature, suggests its potential for universal appeal and offers an apt starting place for approaching the subject.

Knowledge: An artistic concept

Art as a discipline mainly involves two different forms of knowledge. The first is procedural knowledge: how to make an artwork; the sequential application of practical skills, involving hand, eye and brain co-ordination; an ability to follow instructions; and powers of selection or judgement. Procedural knowledge has historically also promoted invention. Both Leonardo da Vinci in the fifteenth century and the Surrealist Max Ernst in the twentieth century proved that drawing and frottage could lead to, or prompt, ideas.

For example, Ernst would set up experiments to initiate creative activity. One such experiment involved taking a rubbed imprint from a floorboard and turning the shapes arising from the imprint into the form of a bird. This is an example of using a procedural process to generate new imaginative ideas. Da Vinci showed that technical mistakes, spillages, could be turned into new forms such as clouds. Both da Vinci and Ernst emphasized that, in art, making is bound up with the concept of feedback, based on an action and a response to the visual result of that action. This suggests that a focus on procedure or technique need not stifle individual expression. Herbert Read cites Benedetto Croce,

a nineteenth-century philosopher, as linking expression to the act of making, stating that the discipline of moulding forms 'is itself a mode of expression' (Read, 1972: 24).

The second form of knowledge is propositional, which encompasses both an understanding of what techniques exist and what they are used for and an awareness of knowledge relating to wider subjects such as history, the history of art, as well as an ability to infer connections between these understandings and the arrangement of compositions in artworks. History of art involves knowledge of styles, which according to the historian and archaeologist Johan Joachim Winkleman, working in the eighteenth century, was the epistemological grounding for the study of artistic styles.

An inventive example of integrating painting with the study of the old masters was introduced at the Bauhaus, a radical multi-disciplinary art school established at Weimar in 1919. Students undertook practical exercises in which they visually analysed, through drawing, the compositions of old master paintings, applying observational skills to breaking images down into their geometric compositional shapes in order to study principles of order, balance and harmony in the arrangement of forms. These exercises enabled students to understand how the disposition of shapes can elicit, for example, a calm mood through balance. Through such knowledge by example (a third type of knowledge) pupils could be taught how to manipulate form in their own works to create specific moods.

Wassili Kandinsky, an inventor of abstract art, taught painting at the Bauhaus. He advocated the creation of formal arrangements of shapes and colours that would convey subjective inner states of mind. He believed that the independent emotive power of colour, line and shape could carry the total expressive force of a painting and therefore free painting from the need to present recognizable subjects and objects. Kandinsky, along with other artists and critics within the Europe-based avant-garde, was attempting, *inter alia*, to free art from what was thought to be an erroneous conflation of artistic worth with verisimilitude and its valuation above all other artistic considerations.

The Bauhaus teaching methods offer a tangible procedural route to learning about composition by drawing attention to the expressive power of symmetrical or asymmetrical forms to convey balance or movement, whether in a classical style, as shown in Nicolas Poussin's landscapes, or in an abstract form, as seen in a Piet Mondrian painting.[4] In this way students were introduced to the concepts of enduring characteristics of harmony and balance, characteristics that transcend differences in historical styles.

How subject knowledge is revealed

An in-depth analysis of three paintings from different historic periods can demonstrate how methods and materials can be manipulated to create illusions of reality and assert the expressive independence of colour and form as well as suggest equivalent relationships to those observed in nature. Studying specific works in detail can also allow pupils to explore the impact of a particular historical moment on an artist's interpretation of a subject or theme. Charles Baudelaire, a nineteenth-century writer, stressed that every 'age had its own gait, glance and gesture' (Harrison et al., 1998: 498) and that the artist's task was to extract from their own era 'whatever element it may contain of poetry within history, to distil the eternal from the transitory' (1998: 497). This raises the questions of which features in an artwork create an enduring beauty and what pleasures the maker and the viewer can derive from these beauty-bearing, or beauty-evoking, features.

The art historian Read (1972) believed that we appreciate beauty when we perceive a unity or harmony of formal relations, shapes and colours, just as we perceive ugliness when faced with the opposite. Twentieth-century art movements such as Expressionism challenged such notions of beauty and instead prioritized the direct expression of inner feelings through clashing colours and jagged shapes, finding beauty in the sincerity of the inner urge expressed.[5] The substance of beauty is affected by the social dimension but, as Baudelaire observed, beauty in art is imagination applied to revealing eternal qualities, harmonious arrangements of forms, colours and slices of life, extracted from observations of the 'contemporary'. Abbs (1994) addresses a mid-point between the social dimensions of art and individual artistic expression in teaching when he writes:

> In attending to the supposedly autonomous natural child a multitude of arts teachers came to neglect, even to deny, the place of technique, of artistic exemplar, of continuous tradition, of the need for a coherent grammar of creative expression. (1994: 183)

The strength of Abbs, who is a critical admirer of Read, is in his attempt to provide an account of the arts in education that draws on a theory of aesthetics without underestimating the importance of art as an engaging act of 'making', which depends on feedback and skill. He also writes in a non-specialist language accessible to educators in general.

I now turn to the first of my analyses of three paintings to explore the types of knowledge art education entails.

Three paintings in focus

The Early Renaissance: Objectivity, empirical and theoretical knowledge

> From the outset, the Italian Renaissance was seen as progressive, every gain in knowledge or technique judged an improvement. (Clarke, 2007: 44)

Masaccio's *The Virgin and Child*, 1426, was the central panel of the Pisa altarpiece, made for the burial chapel of Giuliano di Colino degli Scarci in the church of Santa Maria del Carmine (Figure 4.1). Before the altarpiece was dismantled there were side panels with saints, a small crucifixion at the top and depictions of biblical episodes at the bottom, with a Nativity in the centre of the bottom row. It described the story of Christ from birth to death, focusing on the role of the Madonna.

Figure 4.1 *The Virgin and Child* from the Pisa Polyptych, Masaccio, 1426, panel 134.8 × 73.5 cm (Reproduced by permission of the National Gallery, London)

It is a painting that exemplifies three major concerns that preoccupied artists in the Early Renaissance, and it could provide a rich source for study. Firstly, it reveals an ambition to attain a greater degree of realism in its representation of the central figures, which suggests the growing artistic importance of making first-hand observational studies. Vasari (1965), the earliest writer on the Renaissance, praised Masaccio for a great use of studies and drawings from nature.

This new interest in direct observation is shown in the bulky, sculptural treatment of the centrally seated Madonna and child, modelled in tonal colour through directional lighting and shade, and bearing heavy unidealized facial features. There is also a theory that Masaccio made a model throne with a clay Madonna in it to chart the behaviour of light, the way it illuminates and casts shadows (Hartt, 1994). This experiment illustrates the artist's desire to paint from direct observation and incorporate empirical knowledge in order to transform a three-dimensional form into a more realistic two-dimensional representation.

Masaccio's use of directional lighting was also present in his Brancacci chapel frescoes, c.1425. Later in the fifteenth century, Michelangelo made studies there in order to learn chiaroscuro (modelling through light and shade). Such information could show pupils that technical skills can be learnt from studying examples of specific techniques and could provide the basis for discussion as to why they were developed. In Masaccio's case, the illusion of physical presence was created through the combination of perspective and chiaroscuro in order to inject a convincing illusion of life into religious narratives. In this way pupils could be introduced to the social and historical dimensions of stylistic development in painting and develop observational skills in looking at paintings.

Secondly, Masaccio's interest in ancient Greek and Roman architecture demonstrates a desire to reconnect with classical knowledge, prompted, in part, by the rediscovery of classical texts during the Renaissance. This is reflected by the use of classical columns in the Madonna's throne, which incorporates Corinthian, Ionic and Composite columns. The throne resembles a classical building. The decision to paint the throne in this manner could be indicative of the fact that with the revived interest in and respect for ancient Greek and Roman art and architecture these forms were seen to be examples of order, harmony and perfection.

Masaccio's borrowing of a motif from architecture – that of a classical building – with which to present a representation of a throne promotes an imaginative approach to taking information from one source

and creating something new with it, in this instance based on shared structural features. It alludes to the potential for an imaginative freedom in art. The adaptability of forms can promote the creation of innovative works that speak to both established artistic forms and also point to new possibilities. The painting's solidity and presence, in part created through light and shade, was also created through the use of single-point perspective.

Finally, linear perspective, invented by the architect Filippo Brunelleschi, is the third important Renaissance innovation, after heightened realism and the revival of antique forms. It enabled artists to create a convincing illusion of three-dimensional unified space in which objects relate in scale with each other. It is a codified system based on geometry and can therefore be taught exactly and is still being taught. The skill of producing a single-point perspective drawing, according to rules and procedural skill, can be integrated with a theoretical explanation of its symbolic purposes in art.

Developments in Renaissance art were coterminous with the development of Italian city states, whose official culture and etiquette created new sources of artistic patronage and a fertile artistic milieu that allowed talented individuals opportunities to hone their talents over time. Gombrich (1973) points out that in Renaissance Italy, the Church began to increase its artistic commissions as it felt the pressure of dwindling audiences (or perhaps their dwindling attention if not numbers); more realistic and vivid portrayals was one way of bringing sermons to life.

Perspective emphasizes the centrality of humans; their individual physical position determines the eye level of the vanishing point. Being human was of central importance and relates to the growing veneration for humanist studies during the Renaissance. The rediscovery and circulation of texts by ancient scholars, mentioned earlier, was an important contributing factor in this development as these classical texts stood as aspirational examples for human learning and achievement.

One example of the growing influence of classical ideas is that of Vitruvius' writings on architecture, which had an impact on Renaissance artists.[6] He advocated that geometric perfection – order, harmony and proportion – reflected God's perfection. Perspective increased the impression of the presence, the tangibility, of God's perfect world. According to Read, in Ancient Greece all human values were exalted and they 'saw in the gods nothing but man writ large' (1972: 21).

The Pisa altarpiece combines traditional and innovatory features, which exemplify the concepts of improvement and progression. The

background is traditional flat gothic gold leaf, contrasting with the illusionistic painted throne. Gold leaf was an expensive material that suggested a heavenly glow of light and also equated a rich material with the spiritual richness of heaven itself. An examination of the Pisa Madonna unites knowledge of procedures with knowledge of history, religion and innovation, all of which are essential for understanding art as a subject that reaches out into other areas of knowledge.

Romanticism: Subjectivity and colour

Eugène Delacroix's painting *The Death of Sardanapalus*, 1827, is dominated by a vertiginous red diagonal slant (Figure 4.2); all Renaissance rules of order and balance are replaced by shapes and colours that sweep and swirl in circular, triangular and diagonal movements – shapes that could suggest to pupils a free and mobile approach, like taking a brush for a walk. Colours, lines and forms carry the theatrical subject in what Walter Friedlander referred to as 'a river of force' (1972: 110).

The painting provides a demonstration of intense drama and emotion, individuality and heightened expression in art while also

Figure 4.2 *The Death of Sardanapalus*, Delacroix, 1827, 392 × 496 cm (Reproduced by permission of the Louvre, Paris)

reflecting the Baroque tradition.[7] The subject matter is violent. Sardanapalus, the king of Nineveh, when besieged, gathered together in his chamber his servants, animals, concubines, and bejewelled possessions and ordered their destruction and his self-immolation. Delacroix strove to join all the forms and colours of the painting into a single harmony.

The subject's violence is matched by the pulsating colours and play of light and dark. Teachers could allude to this aspect to introduce pupils to the expressive potential of colour to convey drama. Colours are linked through the writhing bodies, white ones creating an elongated circle around the king, brown and olive bodies and grey smoke form an outer circle, with flame red, reflecting the theme of fire, running diagonally from the bottom right corner to the top left.

The violent subject was inspired by a tragedy, *Sardanapalus* (1821), written by the poet Byron. It reflects the Romantic taste 'for an inclination towards cruelty' (Friedlander, 1972: 112). The subject is exotic, set in a distant place and time. The space breaks with perspectival rules; the writhing anatomies are distorted versions of Michelangelo's muscular nudes. Colour, rather than line, determines the form. Delacroix's creation of emotionally charged colour relationships and his destruction of rules on anatomy and perspective assert artistic freedom through a process of creation and destruction in relation to established conventions, thus echoing the theme of the story.

Even with such an assertion of imaginative power, the technical knowledge that Delacroix utilized shows that he did not reject systematic research or propositional knowledge. Delacroix produced strict principles for arranging colours on his palettes according to the moods he wished to express; the colours were arranged as such:

> tones contrasting and even complimentary to each other were to be laid out side-by-side on the palette at the same level of value and they were to be grouped numerically with all those of similar value. (Gage, 2001: 186)

According to Delacroix's assistants he spent weeks combining his tonal relationships on his palette and trying them out on strips of canvas pinned to the walls of his studio before he started his large canvases. He also travelled to Tangiers and wrote extensive notes on people's features, skin tones and clothes; this demonstrates the value of first-hand empirical observation as a basis for research. Knowledge of such procedures and a detailed analysis of how he mixed his colours could be used to teach pupils similar procedural skills in handling

colour while also emphasizing the underlying expressive purpose behind the technique.

Contextual knowledge of art history and Delacroix's methods shows that even in highly colourful, swirling, seemingly spontaneous paintings there is a role for organized research and interests in other fields of knowledge. Delacroix could be seen as the perfect pupil, combining procedural and propositional knowledge in his works and yet producing a result that seems urgently fresh. He reveals that invention can spring from knowing rules so profoundly that they can be broken inventively. The compositional and colour inventions are what creates the powerful image of violence: the sexuality of the white female nudes and the exaggeratedly muscular African and Arab males. These portrayals of humans can be explored in relation to both the painting's historical and social context and the ways in which form creates and represents content. Such an approach could encourage a questioning debate on how themes of 'portrayal' and 'identity' are constructed and on censorship of images in the arts.[8]

Twentieth-century Cubism: Invention and knowledge

> Art is a lie that makes us realize truth, at least by the truth that is given us to understand. (Picasso, 1923: 315)

Pablo Picasso's statement captures the essence of art's relationship with truth and reality. Art can reveal truths about the physical world and human subjective faculties, but it is also an illusion that relies on a selection or synthesis of observations, experience and different fields of knowledge. Picasso's fellow cubist, Georges Braque, embraced the limitations that a flat canvas imposed on creating an illusion of depth; he accentuated its flatness. His stated aim was not to imitate an appearance but to create an appearance. He said, 'In art, progress does not consist in extension, but in knowledge of limits. Limitations of means determines style, engenders new form, and gives impulse to creation' (Braque, 1975: 260). This statement supports the potential for creativity within a prescribed framework by introducing pupils to the idea that a specific range of selected materials can be used to create a composition and, more significantly, in identifying and working within a range of restrictions.

In 1912 Picasso produced *Still Life with Chair Caning*, the first deliberate collage in a painting in the twentieth century (Figure 4.3). It raised questions about truth and illusion, perspective and the role of the subjective self in objective observation. Knowledge of new geometries and Bergson's theories of time influenced Picasso in his innovatory style

Figure 4.3 *Still Life with Chair Caning*, Picasso, 1912, 27 × 35 cm (Musée National Picasso, Paris. © Succession Picasso/DACS, London 2017. Reproduced by permission)

for depicting space. The painting is oval in format, framed by a piece of rope, and the composition is made up from intersecting, straight lines and curves hovering over rectangular and curved planes, almost parallel to the picture surface, reducing depth to a minimum.

Tone is created through a monochrome palette of grey, ochre and white patches of brushstrokes smeared and modulated across the surface to create an effect of hide and seek between light and mid tones. Smeared tones overlap the imitation chair caning oilcloth, paradoxically implying that they are closer to the surface than the glued cloth. Every shape is vying for a position within a shallow depth. The letters JOU almost project out of the surface. Letters were introduced into cubist pictures to create a new layer of space and to hint at life outside the picture through a word. Pasted oilcloth was a way of adding another spatial layer once space within the painting was near to the surface. It also referred to the outside world, cheap tablecloths and cafes, and functioned as a *trompe l'oeil* illusionistic device.

The Cubists rejected linear perspective, but Picasso explored a new geometry in Cubism. He responded to the mathematician Henri Poincare's non-Euclidian geometries of malleable space, which involve a fusion of visual, tactile and motor experiences of space. These new theories proposed a subjective experience of space that Picasso's artistic form evokes. Picasso's dissections of objects and his presentation of multiple viewpoints unite tactile and visual information through which

he suggests a mobile notion of time in which memory and anticipation invade the present moment. These ideas came from Henry Bergson who believed in exploring the 'inner nature of reality through the flow of time' (Antliff and Leighten, 2001: 72), which relates to an individual experience of time governed by the senses and memory.

An analysis of the form and content of the painting can teach pupils about experiments in mixed media, approaches to space and concepts of geometry. Picasso overlaps, fractures and reassembles spaces to convey the subjective nature of vision, a vision where many views are reassembled to suggest the action of a person looking in and around the objects that interest them. This could promote procedural experiments for pupils in finding and assembling materials to express visual preferences for objects and materials, which could incorporate memories and associations of objects and their uses. Propositional knowledge through investigating theories on how we see could be included. The painting provides an example of inventiveness in methods and materials through the addition of oilcloth and rope as physical tokens from life.

The Cubists' ordering of a subjective, tactile experience of space also draws on logical as well as procedural invention. This is evident in the way Picasso overlaps, fractures and reassembles spaces to convey the subjective nature of vision and the realities of ordinary objects. These procedural skills are also influenced by his propositional knowledge and his interest in modern mathematical and philosophical inquiries into the nature of time and space. He also plays with the idea of art as an illusion, an idea that could generate discussions for pupils into the meanings and purposes of art's relationship with reality.

Conclusion

The investigation of the three paintings above illustrates the educational value of studying original sources, or reproductions, for developing subject knowledge in art. Practical experiments and theoretical investigations can branch out from reference to an original source. I have, in the past, used Vincent van Gogh's *Bedroom* (1888) to explain the expressive role of colour, showing pupils why and how Van Gogh used different yellows to create a mood and then asked them to produce their own bedroom moods using alternative colours for their symbolic and expressive meanings. I also discussed Theodore Gericault's *Raft of the Medusa* (1818–19) in a primary school project in which pupils made model rafts, prioritizing structural strength, in response to the painting's

story and the way the raft was painted. The aim was to try and get pupils to understand the relationships between vision, representation and the craft of making an aesthetic object.

Practical art and art history are both needed; they both contribute to the educational value in showing how the making of art is executed, how materials are manipulated and how methods relate to intentions. By demystifying artworks through analysis, pupils can understand that art is not an instinctive activity, disconnected from study. Knowledge of the history of styles and individual works in the syllabus is vital if pupils are to be moved away from producing art that quotes famous artworks superficially. Instead, pupils should be led towards creative inventions and innovations supported by knowledge of established procedural practices.

Art is about an absorption in the creative process of making a visual object that can reflect ideas, beliefs, feelings and an understanding of aspects of the world around us. These qualities make it a vital subject for pupils, allowing them to have the pleasure of producing a unique object that distinguishes and objectifies an aspect of their individuality but can be shared with others.

Notes

1   Until the twentieth century the majority of artworks across South, West and East Africa (from the 1600s to the 1900s) were three-dimensional carvings in wood or soapstone, or pieces modelled in terracotta and cast in bronze as both sculpture in the round and relief sculpture (as in the Benin Bronzes Palace reliefs). Tanzania has the modern Tingatinga style of painting, which was developed in the second half of the twentieth century.

2   The interdependence of practice and theory was highlighted by the rise of art criticism from the 1950s, led by Harold Rosenberg and Clement Greenberg in New York. Criticism developed hand in hand with abstract art. Writers needed to interpret the new language of abstraction and explain meanings and historic influences to the public. Greenberg asserted that abstract art evolved from historic examples of paintings in which the flatness of the picture plane was prominent (he cited the Impressionists). In the case of conceptual art in the 1970s this critical role became vital to explaining art when the art object was hard to identify or was absent, with a caption in its place.

3   Theories on the creation of art history are explored by Bernard Smith in his article 'Modernism in its place' (2000) in *Tate: The Art Magazine*, No. 21.

4   Poussin's ideas on harmonious geometric compositions are exemplified in *Pastoral Landscape* (1650), in which trees and rivers, vertical and horizontal forms, are deliberately balanced in order to create an ideal of calm order. Mondrian also creates order in *Composition in Red, Blue and Yellow* (1930), through an abstract grid of intersecting vertical and horizontal lines enclosing primary blocks of colour, exploring the basic harmony of a cross shape.

5   The Expressionist painter Ernst Ludwig Kirchner believed that directness and authenticity of expression were more important than traditional notions of beauty. See 'Ernst Ludwig Kirchner (1880–1934): Programme of the Brucke' in Harrison, C., Wood, P. and Gaiger, J. (1992) *Art in Theory 1900–2000: An anthology of changing ideas*. Oxford: Blackwell.

6   Vitruvius was a Roman author, architect and engineer working in the first century BCE. His book *The Ten Books on Architecture* was rediscovered in 1414 by Roggio Bracciolini. His

writing influenced the Renaissance architect Leon Alberti who then conveyed his ideas to early Renaissance painters through his book *Della Pittura* (1435).

7   Baroque is a seventeenth-century style associated with the irrational, with extreme religious emotionalism, dynamic energy, circular and diagonal forms, richness of colour and decoration. Rubens was an exponent of this style though he had studied the Renaissance masters closely.

8   The performance at Manchester Art Gallery 'Presenting the Female Body: Challenging a Victorian fantasy', 8 February 2018, removed Waterhouse's pre-Raphaelite painting *Hylas and the Nymphs* from its collection for eight days, as a performance piece, to discuss ways in which the painting could be re-contextualized in response to issues of race, gender and sexuality. It could be argued that the act of its removal would close down, rather than open out, a discussion because the visual evidence was absent.

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5
Drama

Martin Robinson

We loved the way that a chance encounter with this work or that …
could change your own perspective for years and years to come, how one
engaged in a strange conversation with people you might not ever meet,
over oceans, between cities, over time.

(Etchells, 1999)

Purpose and origins

The arts are a study on what it is to be human; they tap into our subjective experience of the world and help us to make sense of our lives. This enrichment of the subjective realm is difficult to quantify and by trying we reduce the very art we wish to protect. A school that shrinks the arts provision that its pupils can access is making a decision about what they think their priorities should be. If they are guided by utilitarian choices then it is easy for them to cut back on arts programmes because it is far less easy to justify the arts on these terms than, say, maths. But if they are guided by the desire to educate their pupils as to what is important to them as human beings to make sense of the world and their place within it, then they will do their very best to ensure the arts have a proper and sustainable place in their curriculum.

The art form of drama is established in many different cultures around the world; in 'the Western tradition' it was the Ancient Greeks who shaped much of the approach that survives to this day. Great playwrights competed in Dionysian festivals. Tied to wine drinking, singing and dancing, when serious, according to Aristotle, it led to tragedy and when more informal it led to the satyr play. Each group that competed had a chorus and, according to an anonymous source,

someone who 'answered' the chorus, hence the Greek word for actor, 'hypokrites', which means 'answerer'. According to tradition the writer Thespis cemented this practice and so we get the word 'thespian', which, to this day, is associated with the dramatic art. Greek drama presents epic tales, great myths, gods and choruses and, at its heart, the stories of flawed individuals dealing with their ordinary lives and feelings set in front of the backdrop of momentous events. Perhaps much of this remains at the centre of concerns for storytelling to this day. Whether it is the story of *Macbeth*, *Les Miserables*, *Warhorse*, *The Cherry Orchard*, *Come from Away*, *La Boheme*, *Hamilton* or any other extravaganza in the West End or beyond, we have a rich tradition to thank the Greeks for. Yet drama in schools has other traditions on which it draws.

Drama has a unique place among the arts subjects, in that it has important roots in UK schools as a pedagogical tool, a way of exploring social themes, rather than being studied as an intrinsic art form. The thematic approach to drama teaching might be exploring issues that a teacher or student feels is particularly socially relevant; for example 'drugs', 'gangs', 'sexism', 'racism' or 'social class' might be explored often using photographs, poems, stories and historical events as a stimulus. This has shaped much of the history of drama as a subject in British schools. Dewey's ideas that children learn best by doing, and that play and problem solving were vital for childhood development, influenced a generation of educators who brought pedagogical or 'educational' drama centre stage in UK schools during the 1960s, 1970s, 1980s and beyond. Drama as an educational method seemed in tune with the newly comprehensive schools, and it was this approach, not through the teaching of theatre or drama as an 'Art form' with a capital A but as a movement, that saw drama as a way of raising issues to engender empathy.

The study of drama as a subject was introduced into schools in a number of guises, such as Drama for Education, Drama in Education, Process Drama, Theatre in Education or Drama as a Learning Medium. The subject was used as a way of teaching and learning by exploring 'issues', constructing alternative stories and using a variety of techniques to explore political themes of class, exploitation and status.

In the heady mix of the 1960s, 1970s and 1980s lots of drama rooms were very radical places. This happy breed of radical drama teachers was less focused on performance than the old-style teacher who might have taken on the school play, maybe Shakespeare or, in really musty, maybe ex-grammar, schools, Gilbert and Sullivan. The radical drama practices came from a similar place to Paulo Freire and his *Pedagogy of the Oppressed* (2005). A new form of drama was being made;

it rejected the 'tradition' of theatre, and also, importantly, the idea of authority itself. Drama in schools meant creating a space for pupil's voices and concerns to be heard. The drama classroom was subtly 'anti-authority'. Instead of a classroom of pupils sitting in rows, facing the teacher, the drama space was full of active meaning making, group work and, importantly, sitting in a circle as a sign of a more egalitarian ideal. The teacher was very much a guide on the side, commenting on rather than leading the action.

Dorothy Heathcote's Mantle of the Expert (Heathcote and Bolton, 1995) was very much part of this approach. This method inspired the notion of the 'actor-teacher' or 'teacher-in-role', where the educator divests themselves of the authority of the teacher and takes on, instead, various types of characters to transmit the thinking that would frame the debate. 'Theatre of the oppressed', Augusto Boal's wonderful method of exploring what power people might have in a given situation to take more control of their lives, became another tool in the armoury. He introduces the idea of the 'SpectActor', where the line drawn between spectator and actor becomes fuzzy, a place in which all can act, spectate and comment. The lines of demarcation typical in traditional classrooms were breaking down – drama classrooms were an egalitarian place.

This type of drama teaching drew on several improvisational tools for exploration that helped children tell their stories. Pupils were encouraged to take part in creating 'still-images', 'hot-seating', 'thought-tracking' or 'freeze-frames'. Such methods and techniques had little to do with the 'art of theatre' but everything to do with enabling children to express their feelings and opinions within a restricted frame of reference. Children were 'expected' to take the side of the downtrodden and express misgivings about or hatred of those who were the oppressor. These techniques were deemed to be a way to better understand a character than extensive character research. These methods found their way into the drama-teaching lexicon, but they were probably never used by the great actors of the time. Imagine the looks you might get asking John Gielgud, Joyce Grenfell, Larry Olivier or Celia Johnson to explain, let alone adopt, the relative status positions in a 'still image' or to walk through a 'conscience alley'!

These developments emphasized the gap between the art form as practised in the theatre and the one that was extant in the classrooms of Britain. All these classroom-based methods required children to take part in, mainly, improvised exploration, rather than develop the necessary artistic prowess and skill for acting, directing or designing. It was not the quality of the work in this art form that mattered; it was about provoking

pupils' responses. How they 'felt' in character was often more important than the dramatic portrayal of the part they were playing – whatever the children had 'within them' was being drawn out to make the drama, rather than them learning the intricacies of the theatrical art. They might absorb some techniques of performance but mostly this approach was about them doing drama and exploring issues rather than learning about the art form.

It is also notable that in many drama classes, script was not a regular feature. Rather it was spontaneous and rehearsed improvisation and reacting to various stimuli that were the staple diet of the drama room. Texts in this context are understood as stimulus material, which could be any piece of writing, music, photograph or picture that could be used to stimulate improvisational approaches. Rather than a play, children were learning 'to play'. The great plays of the British theatre, notably Shakespeare, would hardly feature in a drama room; these were to remain in the English classroom, drily analysed as pieces of writing rather than as pieces for performance. It might be for this reason that many of the early drama teachers were English teachers looking to expand their pedagogical repertoire.

It is this cross-fertilization with English that has also hampered the study of drama as an art form. English teachers, drawn to drama as a pedagogical tool, were not approaching it from a performance tradition. They found 'writing in role', and also active classroom methods, to be of help at a time when the status of the text in English was being critically reassessed from some quarters of the profession. Getting children out of their seats, physically responding to whatever was being explored, was considered by some to be creative and a more engaging way to tackle the subject than always sitting down with pens and books. Drama, as a subject in its own right, has never featured in the National Curriculum but its techniques have always featured within the National Curriculum for English.

When exams were introduced in drama, for some teachers it was a step too far. How could you assess the worth of what a child had 'inside them'? They questioned the need for assessing performance and, indeed, recognized that if you start to examine it, drama as a subject would change radically. First at Certificate of Secondary Education level, then at GCSE and A levels, from the 1980s onwards drama found its way as a subject, beyond being just a pedagogical tool or the school play. However, the examination syllabus reflected both the tradition of theatre as an art form and drama as a pedagogical tool for exploration in its make-up. Improvisation, exploring and making meaning through techniques such

as still image, thought tracking and so forth were very much centre stage (pun intended) especially at GCSE level.

At A level the focus became more traditionally theatrical. This split was emphasized in the titles of the exams: GCSE Drama and A Level Theatre Studies. Though the GCSE had a formal performance component, it was often based on improvisation. The rest of the exam was explorative, with the written work expanding on the pupils' experiences of their practical work by writing in a character and, sometimes, in a nod towards theatre, a theatre review. The A level, however, was far more academic and far more oriented towards the traditional study of theatre. Students would be asked to study theatre practitioners, Brecht and Stanislavski for example. They would be required to study texts and think about how to put them on stage. They would critique theatre productions at a far higher level than asked at GCSE. It was the establishment of drama as an exam subject that led to it, in many schools, breaking away from English departments or from being seen as solely an extra-curricular activity around school plays and performances.

In 1989 David Hornbook's *Education and Dramatic Art* was published. It was controversial because he argued that educative drama was too closely tied to progressive education and revolutionary politics, and that this was denying pupils the knowledge of a great and historic art form. Although his argument was rooted in a traditional strand of left-wing thought, perhaps echoing certain ideas of Bourdieu and Gramsci, it met with much criticism from influential sections of the drama education community at that time. In the preface to Hornbook's book, Peter Abbs writes: 'Many teachers … see drama as a kind of instrument either to bring about ideological change … political understanding or well-adjusted behaviour. [This] means that one can have drama in the classroom in which there may be virtually no aesthetic or symbolic content, no critical interpretation, no sense of any tradition, no sense of any art form' (1994: 119).

Despite this, drama became an increasingly popular examined subject. According to the Joint Council for Qualifications (JCQ, 2020), in 2007, 102,601 pupils took GCSE at 16. Exam boards tried to devise ways of encapsulating these often-contradictory influences. Many boards enshrined the practice-based methods of 'still-image' and managed to ignore the history of the art form that, in the Western tradition, went back to, most notably, the Ancient Greeks.

Nowadays the position of drama in many schools is precarious; in 2019, according to the JCQ (2020), just 61,772 students took GCSE. Like other arts subjects, drama is not one of the English Baccalaureate

subjects; it is also not a stand-alone subject at GCSE, though it is still in the National Curriculum in English. Where drama does well as a subject, it is in flourishing departments who take children through GCSE, A level, International Baccalaureate, Bachelor of Technology and LAMDA exams. This move towards exams and the ever-growing number of teachers who have been trained in the art of theatre, through the expansion of university courses dedicated to the study of drama from the 1970s onwards, means that teachers are more knowledgeable about the art form rather than the purely pedagogical approaches of earlier pioneers. This is no bad thing as I wish to make the case for the study of drama as an art form.

Drama as an arts-based subject

Where drama *as a subject* is of most value is when it is seen as an art form that *examines* what it is to be human in all its variety: politically, socially, philosophically, physically and poetically. Where drama *as a subject* is of least value is when it is seen as a social and political exercise in which the teacher has already made up his/her mind as to what the outcome should be for each child, whether through bourgeois or child-centred socialization or revolutionary political indoctrination.

 If one wishes to think of this as mainly a theatre art it certainly has connections to dance, performance art, cabaret, speech making, performance poetry, presenting and performance in film and television. I can see a place for these areas being studied alongside drama as theatre-based art forms but the major focus should be live theatre. This can be divided into the arts of acting, directing, dramaturgy, designing, writing/devising and critiquing/responding and the study of the history, forms, genres, practitioners, writers and theorists who have had a major impact on the art form and, potentially, arts administration/management. The study of drama can be ordered into two broad areas: 'practical' and 'theory'. Though there is a good deal of crossover between the two there is a place to separate the two, with the latter being studied in a more 'typical classroom' approach and the former in a physical 'workshop' approach.

 The subject should be rooted in performance, in the physical sense of telling a story to somebody who responds to the telling. This is neatly summed up in Peter Brook's wonderful phrasing, 'I can take any empty space and call it a bare stage. A man walks across this empty space whilst someone else is watching him, and this is all that is needed for an act of

theatre to be engaged' (Brook, 2008: 9). This is where all drama courses in schools can begin. The act of creating an 'empty space', the creation of an audience and its relationship to that space, then someone going into that space and some sort of communication taking place is the art form at its most minimal and true. Beckett notwithstanding, where the performer might be done away with entirely, or a puppet show where marionettes of Punch and Judy take on the human presence, physical communication remains at drama's heart. A performer needs to explore the physical art of performance to find out what they can do, how the 'physical instrument' can be used to create something for an audience to respond to in some way or other.

Drama as an art form is corporeal and highly emotional/spiritual. The physical aspects can be organized into voice and physical movement. Physical movement can, in the first instance, be corporeal. It includes facial expressions, gesture, gait and breath before it takes on 'meaning', which is found in the emotional and spiritual aspects. It involves empathy and sympathy for character as well as digging into one's own (the performer's) deepest feelings and responding to a well of difficult or different situations that may or may not have an immediate resonance. As the physical performance evolves in this process, it can be thought about both as a human being making sense of things and as a performer trying to affect an audience as well as respond to a text in a responsible manner. It is also about working as a team with other performers and other theatre workers, including designers and directors, in making pieces of theatre that work with a sense of cohesion.

A drama student needs to be physically and vocally adept and be able to communicate story, character and feeling, both individually and as part of a group. The actor needs to appreciate what they can do from the inside out. The performer asks: 'How do I know if this is good or right or effective?' They need to develop their intuition and be able to read an audience. The actor needs to be emotionally mature, able to draw freely on a range of emotions, and to feel like they are feeling but not lose themselves in the emotion. They need to be able to reflect and talk about the work, emotionally, physically and as a performance. So they need a fully developed performance and rehearsal vocabulary. They also take on the role of a dramaturg – they need to have a command of theory, not just about text but also about a truth in the performance they are creating: 'Would my character do this? Would they wear this? Would they speak like this?' 'Does this fit with the genre?' and so forth. Dramaturgy is also about genre and form, the desires of the production team and the meaning they all wish to communicate to an audience.

As a drama teacher I sum all this up with four words: Movement, Emotion, Intellect, Performance. Teaching drama should look to develop all four areas to a very high level. As we start with movement the roots of movement must be in stillness and silence. The most important first lesson is therefore how to 'centre'. From this all else emanates. In the drama room I have no chairs, and as there are no 'set' places for a child to sit, the danger is that they can run free, make a lot of noise and get away with doing anything they want because, if challenged, they can retort: *'But, we was only acting sir…!'* This is the reason why, to me, discipline is an essential component of a classroom culture. It is the same in every class, of course, and the discipline that works best for me is that which is drawn from, and refers to, the nature of the subject being taught as well as that of the class being taught, the school in which the lesson takes place and the character of the teacher teaching it.

As a drama teacher, this is why the first concept I teach a class is 'how to centre' – specifically, how to be quiet, how to be still and how to obey directions. This, I suggest, is the most important state to conquer. Students have to stand in a space, equidistant from each other, and away from walls, with their arms by their side, feet shoulder-width apart, back, neck, head straight and eyes closed. This can be adapted for individual students who are physically unable to do it. They breathe in through the nose and out through the mouth. I then do some other physical exercises and when I say 'centre' they have to adopt the 'centred' position within 10, 5, then 3 seconds.

This physical focal point is the heart of the classroom culture. Once mastered, they learn how to move into other states. They learn how a slight change of the foot or arm or a change in where the 'centre of gravity in a character' might be affects the gait, and from this, the entire physical personality as this 'new person' emerges into the performer's embodied imagination. Pupils realise that to act a new character convincingly they need to be able to adopt a neutral position. That is to say, they need to temporarily supress, or bracket, their own personal physical traits and emotional states.

To focus on the physical side is a wonderful release for pupils. Here, drama feels alive, rather than academic, instead of an overly intellectualised approach to the subject, it is more akin to highly focused play. Ways of focusing on the physical aspects include mask work and movements following certain instructions, such as 'follow the hand'. This is where a pupil first 'centres', then puts one hand palm first in front of their face, opens their eyes and then begins to move their hand keeping their face the same distance from the palm. This is then taken

into pair work where pupils take it in turns to 'be the hand'; pupils then witness the improvisations of other pairs, then return to their explorations. At a certain point the palms no longer take the lead role, but the bodies continue to move around each other in a similar way to before. Again, these are shared. Then exploring different tempos, rhythms and pauses, either through music or continued mime work, the pieces are shared again, perhaps pair to pair. From this the emotional content is discussed. How does one feel watching this? With this we can look to explore how to make this emotional and physical content more audience oriented. What staging works? Notice we still have no idea of story, theme or character. This is a completely different approach to theme-led or text-led work. We try to keep the options open. This can be extremely liberating, or, indeed, annoying, which is when we might bring in the question 'What's my play trying to say?' and then to concentrate minds: 'if in doubt, spell it out!'.

Thus conceived, drama as an aesthetic or arts-based subject needs a broad base of knowledge of ideas, philosophies, theories, stories and story structures in order to be able to 'read into' a disparate collection of 'fragments' of theatre. This is much like the cut-ups work of William Burroughs, who used juxtapositions and collage to react spontaneously to the text rather than trying to deliberately forge a way forward from a readily understood theme at the start. David Bowie used this technique to write some of his lyrics. In an article in the online magazine *Far Out* (2020), he is quoted as saying, 'If you put three or four dissociated ideas together and create awkward relationships with them, the unconscious intelligence that comes from those pairings is really quite startling sometimes, quite provocative.' It is this provocation that can startle students as they see stories emerge, as long as they are patient and do not try to impose a story too early but also do not ignore the necessity of clarity until it is too late. A teacher will be needed to advise how this process can be realized.

There are many good books and ideas about a more 'physical theatre' approach available and I highly recommend some at the end of this piece. Suffice to say getting children to be free of having to think rationally about what they are doing and getting them to 'think' and react physically and, later, emotionally is a liberating approach. Clowning is a good way too, with neutral mask, slapstick and/or other paraphernalia or just with their own physical self; finding 'the fool', the laughter, the melancholy and most of all 'the large' in terms of physical self in a space is extremely rewarding, especially if encountered as a way into the subject. Decidedly 'anti-realism', it can help pupils not worry about over

the top performances, something, which I have to add, also negates the need for filming and looking back at video, because over the top can be even more extreme when viewed through a small screen.

Pupils might be used to doing/performing certain things on TikTok but the stage is an entirely different prospect. Students can find other ways of being at school than the engage brain first approach of most other lessons. But this is not to say that that approach must be overlooked entirely in drama; it cannot be, especially, in what I have termed the 'theory' classes. Of course, there are crossovers from the practical side of the course to the theory side and vice versa. But the theory side can benefit from a reading, writing, discussing, seminar and lecture approach, as well as going to see live, professional theatre. And pupils also need to learn how to talk and write about it. This will enable children to develop their knowledge and critical faculties when being asked to write about theatre in exams and also when discussing their own practical work. Drama students need to develop as independent learners – both as performers and as researchers (dramaturgs). Do they function well in groups? Can they be trusted? Do they bring something to a group that helps make it greater than the sum of its parts? This is not character education; this is an intrinsic part of the form. Theatre is a social art; the forming of a theatre troupe, of performers and designers, is central to the quality of the art as well as the relationship between performers and their audience. How pupils become aware of this over time cannot be left to chance.

What is included in the theory side? Knowledge of genres, forms and styles of theatre across the ages and continents. A sense of how theatre has changed over time and how it has interacted with architecture, technology, other art forms, social, cultural and political changes and commercial pressures. Much of the performance theory can be taught in the workshop/rehearsal space, if you are lucky enough to have one; if not, it is essential to bring a sense of theatre and its workings to any space you have to teach in. A good 'workshop' space is an essential part of good drama teaching. A place in which to work physically, noisily, safely is an important base for this creative art.

I start with the empty space, audience relationship and then build to the most 'traditional' theatre space, that of the 'end-on' stage, also known as Proscenium Arch. Then the areas of the stage are introduced, 1 to 9,[1] and other information about how to get the stage to work for you. Here students are given a shared language and understanding for describing the stage, how the stage works from performers', director's, and then from a designer's perspective. Sets, lighting, stage properties,

costume and make-up can all be discussed and taught from this understanding. Other versions of staging can then be introduced and taught alongside each other. Here we begin to see that staging and genre go together. Different approaches are taken to theatre depending on a whole host of reasons – the conventions of time, place and, particularly in contemporary circles, political and cultural choices.

Performance theory is important; it provides a way to deconstruct performance and talk about it as a whole, and in its elements, with a rich and technically informed vocabulary. Students must also develop an aesthetic understanding and vocabulary. Can they discuss what might make something good? What might make it work? How it works or why it did not work? And in such a way as they might agree or disagree with others, including their teachers, in an educated and informed way? They need to know what they need to research, and how to research something about contexts of time and place, the playwright, the play, genre and so forth. Do they know how to research and how to select what to use, or ignore, when putting their work together? Theory covers Page to Stage and, in reverse, Stage to Page – deconstructing and constructing the 'semiotics' of theatre and developing aesthetic and critical appreciation.

Theory and curriculum

What to include and in what order? Theatre as a museum piece is useful but it is also the most live of the live arts in that it has to be three-dimensional to be fully appreciated – a video is never the same for the theatre and is often a poor version of film acting. Theatre must be seen and therefore the contemporary, the avant-garde and the popular must be taught and experienced. A good example of this might be one of the most popular shows ever seen worldwide, which is Disney's *Lion King*. It is an extremely popular show, yet Julie Taymor, the director, comes from world theatre and the avant-garde. She learnt Indonesian dance drama, Wayang Kulit shadow puppetry and the physical theatre approaches at the L'Ècole Internationale de Théâtre Jacques Lecoq. In addition, a breadth of other theatrical and life experiences have informed her work.

It is this breadth that informs exciting developments throughout contemporary theatre but, especially with younger pupils, it is important to have real depth and *a way* as well as 'ways' of working. A knowledge of world theatre and of the Western tradition provides a wide range of

possibilities, which include: the Greeks, Mummer's plays, Elizabethan theatre, Restoration theatre, *Commedia del Arte*, Realism and Naturalism (including Stanislavski), Expressionism and Epic (including Brecht and Joan Littlewood), symbolic, surreal and absurd theatre (including Artaud, Beckett, Berkoff and Kane), physical, mime, Noh theatre, ritual and performative forms from the African tradition (including storytelling), Kathakali, dance theatre (including Complicité and Pina Bausch), musical theatre, opera, performance art, site specific and even TV and film.

A discussion around truth helps focus the work. For example, is truth in theatre served by realism, in which truth is served by representation looking and sounding true to life? Or is it served by the social truth of a Brechtian approach, in which the stage presentation does not look real to life, but through the 'alienation effect' the audience experiences exposes the truth of how society, according to Brecht, really works? Or maybe theatre best serves a spiritual truth as exemplified by an Artaudian approach, in which the presentation is no longer about things looking real or exposing a social or political truth, rather the audience member is asked 'how does it feel?' as a piece of 'theatre of cruelty' explodes all around them. By asking these questions and studying different aspects of the art form alongside each other, students begin to develop their own ideas and tastes. It is of utmost importance for pupils to develop their own theatrical palates through such comparisons.

Key texts to study could include Aristotle's *Aesthetics*, Konstantin Stanislavski's *An Actor Prepares*, Antonin Artaud's *Theatre and Its Double*, a collection of Bertolt Brecht's writings and Peter Brook's *Empty Space*. And plays such as: *Antigone*, *Servant and Two Masters*, *Midsummer Night's Dream*, *The Tempest*, *Woyzeck*, *The Seagull*, *The Caucasian Chalk Circle*, *Waiting for Godot*, *Blasted*, *The Lion King*, *Show-Boat*, *Oh What a Lovely War*, *Hamilton* and any number of contemporary plays that continue to invigorate this art form.

I cannot think of any reason to argue that drama is of particular value to a child. Rather it has a peculiar value. Not in the sense of weird, though some drama undoubtedly is, but in the sense of being peculiar to each child in that for some it will be absolutely life changing, life affirming, an opening into a whole world of meaning through play that will be with them for a lifetime. For others it will be as a welcome to an art form that they will access through films and other electronic means, with occasional visits to the theatre dotted over the years. They will be enriched by the further experiences they are afforded with deeper insights than some who have not had this world open to them. For many

it will offer a patchwork of different ways of being in the world, a world of empathy, of story, of character, of ideas, of great conversations, and a way of finding that always, in that old cliché, 'the show must go on …' Especially if they have had opportunities to perform in, or produce, plays themselves.

Note

1　The 1 to 9 was revealed to me by the great and eccentric theatre maker Ken Campbell, sadly no longer with us. Each area of the stage is awarded a number: downstage centre is 1, centre stage is 2, downstage right is 3, downstage left is 4, centre stage right is 5, centre stage left is 6, upstage centre is 7, upstage right is 8 and upstage left is 9. Once this is understood, stage positioning can be used to explore where the audience are likely to focus more and also how they read the associated power of certain characters in a scene. For example, a character downstage centre is in the most notable and powerful position of all. Added to this there are many other pieces of knowledge in the actors' armoury that really help performers communicate effectively, too many to list here.

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6
Music

Simon Toyne

We need to decide what classroom music actually is, and then its purpose may become clearer.

(Fautley, 2019)

Music is an unusual school subject. While school choirs, bands and orchestras are a source of pride for schools and their communities, and musical achievements of individual students – whether gaining Grade 8 distinction on an instrument or performing on the local professional stage – are celebrated through presentations in assemblies and with associated press releases, music in the classroom has an altogether different status. Often the last piece of the timetabling jigsaw, taught by the only specialist music teacher in the school who may have to teach a second subject in order to remain in full-time employment, music is not experienced as a weekly lesson across the three years of Key Stage 3 by many students in the country (Daubney et al., 2019: 10). Similarly, an even bigger, and overwhelming, majority of students (94 per cent) do not opt to study music in the classroom after Key Stage 3. Martin Fautley's question is therefore both apposite and urgent. Why study music?

Music education in crisis

At the time of writing, there is widespread concern that music education is in crisis. The headline figures have been the reduction in GCSE music entries of more than 20 per cent since 2014/15 and music A level being the fastest disappearing subject, with a drop of 25 per cent since 2014/15.

In 2019, there were only 5,124 A-level entries across the country out of a total of 745,585 provisional A-level entries for that year (Ofqual, 2019).

There are some contributing factors to this – the pressure on schools to ensure their students are entered for the EBacc at GCSE and to choose 'facilitating subjects' at A level are often cited. Moreover, the need to demonstrate skill as a performer as part of GCSE and A-level specifications does necessitate, in most instances, one-to-one instrumental or vocal tuition outside the classroom, with their attendant costs.

Eighty-nine per cent of parents of students receiving one-to-one tuition make a financial contribution towards that tuition. Cultural and socio-economic background therefore plays a part in students' ability to take music further after Year 9. A recent report showed that while 52 per cent of students with graduate parents will learn a musical instrument at some point at school, the same would hold true for only 21 per cent of students whose parents' education finished at secondary school. The same report highlighted that children in families with a combined income of more than £46,000 per annum are twice as likely to learn an instrument as those children in families with a combined income of £28,000 or less. Since 2014, entries to ABRSM (Associated Board of the Royal Schools of Music) graded music examinations (grades 1 to 8) in England have fallen by almost 42,000, a drop of 18.6 per cent. At Key Stage 3, where music is a statutory classroom subject for three years, over 50 per cent of state schools offer music as an optional subject in Year 9; in many schools, music is taught on a 'carousel', only offered for part of the year on rotation with other subjects, usually arts. The percentage of time devoted to music has also diminished, with only 3.1 per cent of the curriculum time being allocated to Key Stage 3 music.

Music is perhaps the only school subject where an understanding of its place within the current educational landscape is essential before one begins to ask what should be taught and how it should be taught. Teaching classroom music can be a lonely, bewildering and overwhelming experience, exacerbated by the conflicting opinions from government ministers, university music departments and professional musicians, let alone the music education world on social media, about the role of music in schools. For many, it is about the number of students learning instruments and playing in school ensembles; for some, what repertoire students know (often with an expectation that all students need to know 'the canon' by the time they leave school); for others, how many students can read staff notation. In almost all instances, senior leadership teams measure the success of secondary school music departments by the number of students choosing the subject for GCSE and A level.

Where under 6 per cent of students nationally are currently choosing (or are allowed to choose) the subject at GCSE level, this has to be a blunt and flawed device for measuring impact. Then there is what 'knowing' constitutes with relation to music and the relationship between knowledge and skills – especially important to clarify in these 'knowledge-rich' times.

In short, provision for music is inadequate and the understanding of what constitutes it is muddled. And a lack of consensus on its purpose has created a disconcerting arbitrariness in terms of what music education pupils receive in school. This chapter therefore seeks to clarify the purpose of classroom music, to expand upon the relationship between the classroom, extra-curricular music and instrumental tuition, to consider what might be meant by musical knowledge and to offer a response to Fautley's thought-provoking challenge.

Developing the next generation of musicians and music lovers

In layman's terms, this is the purpose of music in schools – through a rich and varied experience of making music, understanding the constituent parts of music making, and responding with increasing depth and emotional sensitivity, this great world of music becomes one in which students feel part of and able to explore.

An analogy with sport education might be helpful in shedding light on some key internal features of the subject as well as certain cultural and institutional prerequisites. The distinction between physical education (PE) and games is expressed in the curriculum in sequencing: PE is where fitness, agility and technique are developed. This feeds into games, which is where the procedural knowledge and experience accrued through PE can be more freely developed through performances in team or individual sports. Often this development is supported at an institutional level by inter- and intra-school leagues. In turn, this supports a local community and, subsequently, national sporting culture. In a similar way, classroom music lessons should be the place where students acquire a level of procedural knowledge and introduction to aesthetic understanding, applied through guided practical music making in the classroom, which feeds and encourages participation in school and informal ensembles, concerts and community musical events. Young people are taught how to be musicians and are equipped to make the next steps in their musical lives. As well as developing the next generation

of active musicians, this should contribute to and renew an informed public audience for music.

But can this happen with just one hour of classroom music per week?

Music in schools

This is where we can come into difficulty. A truly musical school holds three distinct, but interlinked, areas of music education in balance (Rogers, 2019):

1. Music in the classroom (the 'taught curriculum'), compulsory until Year 9, then optional for examination classes (GCSE, BTEC, A level)
2. Instrumental and vocal tuition (in groups or one-to-one) and ensemble membership
3. Musical 'events' and opportunities, for example singing in assembly, concerts and shows, trips to professional concerts

Yet most observers (and indeed participants) will often only consider music in school to be one, maybe two, of these areas. Music is unique; therefore, among school subjects, music in schools is about far more than the classroom (Figure 6.1). As Kevin Rogers says, 'all three areas need constant attention: if you diminish one area, you diminish the whole, so you do have to keep looking at all three.'

As illustrated, the sweet spot of music education is the middle of the Venn diagram – all students develop their musicianship and musical

Classroom music

Instrumental and vocal learning; ensembles

Musical 'events' and opportunities
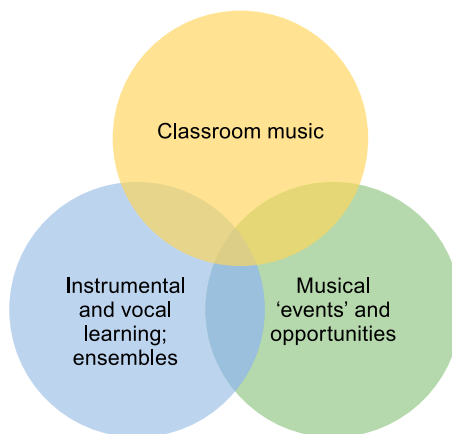
Figure 6.1   A musical school (Rogers, 2019)

understanding through curriculum music, all are given the opportunity to learn an instrument and/or develop their voice through one-to-one tuition and making music with others, and the culture of the school and wider community is one in which music is performed and heard widely and often, and with mutual respect.

Learning an instrument is an essential part of music education. All must have the opportunity to play an instrument and to be able to continue with instrumental tuition in order to gain greater technical security and fluency. But we must be clear that this is not the purpose of *curriculum* music, and it is unrealistic to assume that by the end of Key Stage 3 all students will be able to be fluent on an instrument through curriculum music alone. There is a simple reason for this. Research has shown that practice is the only consistent indicator of performance – not the quality of teaching or parental support. Sloboda et al.'s research (1996) highlighted the mean number of hours necessary to progress from one ABRSM grade to another (Figure 6.2).
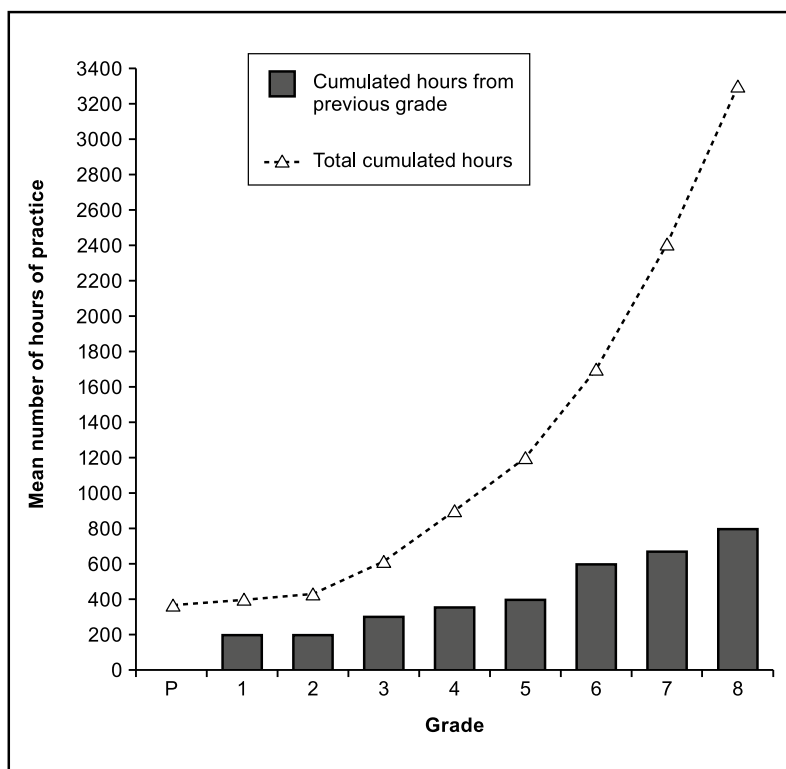
Figure 6.2 The relationship between practice and musical grade (Sloboda et al., 1996, 300. Reproduced by permission of Wiley)

Translating this into what might be achieved by a student beginning to learn an instrument in Year 7, having ten 30-minute one-to-one lessons each term plus some daily practice, these realistic expectations can be drawn:

Grade 1 takes 2.5 years, assuming 125 hours per year (15 hours of direct tuition + 110 hours of practice at 18 minutes per day).

Each subsequent grade takes one year, with increasing practice thus:

Grade 2, a further 150 hours (15 hours tuition + 135 hours of practice at 22 minutes per day).
Grade 3, a further 200 hours (15 hours tuition + 185 hours of practice at 30 minutes per day).
Grade 4, a further 250 hours (15 hours tuition + 235 hours of practice at 39 minutes per day).

These expectations are based on the mean number of hours of necessary individual practice. Some students make significant progress between ages 11 and 16, more often than not, due to playing in orchestras, concert bands, brass bands and other instrumental ensembles (hence the vital importance of ensemble membership – those hours of rehearsals still count as practice). There are no short cuts for the development of technical skills in young musicians – this is a reason why, if we are serious as a country about developing the next generations of musicians, we need continually to invest in instrumental tuition and ensembles. Leaving it only accessible to those with the means to pay for it themselves is culturally divisive and educationally indefensible.

But this exists outside curriculum music and will always do so. Some simple number crunching shows why. The total National Curriculum time for all students across Key Stages 1, 2 and 3 is a notional 350 hours – so that would be just enough time for everyone to get to Grade 1 by the end of Year 9 if the *only* activity in music lessons would be to play. To put this into the context of a secondary school – students starting Key Stage 3 with one hour's lesson each week and 30 minutes homework will complete 150 hours maximum learning/practice if the scheme of work is only learning that instrument (Rogers, 2015). This would, in effect, narrow down the music curriculum considerably.

Expecting fluency on an instrument to be the primary (or indeed any) result of curriculum music is therefore a flawed aim. To pretend otherwise sets up a climate whereby many students increasingly realize, as lessons progress, that they will never be able to attain the same fluency

as those engaged in learning outside the classroom and significant demotivation occurs as a result. This is surely one of the contributing factors to the low take-up of the subject post-Year 9. It suggests that it is better to conceptualize music education and its Key Stage 3 curriculum as a public cultural endeavour to be introduced to the next generation with a view to familiarization rather than as a means for individual perfectibility of performance alone.

It must be noted that the study of music at Key Stage 4 and Key Stage 5 has an entirely different constitution from Key Stage 3, with a third of the marks awarded being solely focused on performing. To gain a high grade in the performing exam, a student needs to be performing at the equivalent of Grade 4 for GCSE or Grade 6 for A level. Higher ABRSM grades than that are, of course, encouraged. To access GCSE and A-level music adequately, therefore, students must be immersed in all three areas of school music – the curriculum, instrumental and vocal learning, and musical events and opportunities.

The third area of school music – of performing and listening opportunities outside the classroom, often referred to as the 'shop window' of the school – is equally important. Rogers (2019) describes these as 'all those opportunities that are so important in making music come alive across a school and be a presence throughout the whole school community. Indeed, they are critically important to how students feel about music, and how they feel about the community they belong to: they provide the wow factor!'

Students need to hear each other perform. Too often, music in schools is only heard in the music department, and a wonderful opportunity for music to be part of the soundtrack of the day – for students and adults alike – can be lost. It is easy in a school to underestimate the power of music as an auditory experience. After all, this is why most people value music – its ability to tap into our psyche and engage, soothe, nourish, excite, invigorate, upset, challenge and change us. A school where everyone listens to and values each other can contribute to a school as a site for nurture and shared experiences and participation in both making and listening to music. A robust music curriculum also introduces pupils to a sample of an important part of *public* art and culture. In his presentation at the Festival of Education, Rogers (2019) remarked that:

> In a fractured, fragmented society, there is nothing better than collective musical endeavour to bring people together in mutual collaboration and respect. In the process, young people will learn about – and value – other people's cultures and types of music. They are also likely, when inspired through the experience of

working with exceptional musicians and performing to apprecia-
tive audiences, to want to engage more with the other aspects of
music education – to take up an instrument, to be part of a choir, to
create their own music in classroom lessons and to find their own
musical voice in the process.

These two important areas of music education cannot achieve their full
potency, however, unless harnessed to, and supported by, a purposeful
music curriculum. This is the area of music education that is guaranteed
for everyone through the National Curriculum and should be at the heart
of schools' music provision. The importance of music in the classroom is
recognized by John Paynter in his seminal *Music in the Secondary School
Curriculum* (1982). So, what should music in the classroom look, and
sound, like?

Curriculum music: A rationale

Curriculum music is, fundamentally, about all students developing
their musical understanding. This must be done through creative,
practical exploration of sounds and music – we are not talking
about passive 'musical appreciation'. But it is about understanding,
getting to know how music works, and how it therefore conveys
meaning. (Rogers, 2019)

As County Inspector for Hampshire Music Service, Rogers articulates a
clear rationale for classroom music and has implemented it successfully
in Hampshire's secondary schools. These schools have seen performance
at Key Stage 3 and Key Stage 4 significantly above national average and
have bucked the trend in increasing the number of students progressing
to GCSE and A level.

The Hampshire model illustrates clearly the principle of 'music
making' and 'music thinking' in developing musical understanding, the
core aim of curriculum music. These two aspects of the curriculum are
supported by specific practical skills and types of listening, talking,
writing and theory. All this activity – of thinking and doing – takes place
within the context of a genre, immersed in its cultural conventions. This
is the most profound way in which music develops 'cultural capital' – the
nature of students' thinking and doing is conditioned by the genre in
which they are engaging (Rogers, 2015) (Figure 6.3).

Thus, rather than what Rogers describes as superficial imitation,
such as when pupils learn about Reggae by finding out about Bob Marley

A model of learning for KS3 Music

Musical understanding

The Hampshire Music Education Framework aims to ensure that all pupils acquire musical understanding. This is the outcome of creative engagement in practical activities which enable pupils to develop 'music making and thinking in context'.

Music thinking

learning how to listen to and identify the structural and expressive aspects of music from different styles, genres and traditions; how to improve work in progress; and how to evaluate music's quality.

Supported by specific types of listening, talking, writing, and theory:

identify, refine, evaluate aspects of work created and heard; features of the dimensions of music; appropriate use of notations, etc.

Personal attributes

imagination, resilience, determination, risk-taking, willingness to be open to new musical experiences, capacity to learn from mistakes and constructive criticism should all be built in to students' musical experiences.

In context

learning how to change the way we create, perform and listen to music in ways that better reflect music's historical, social and cultural origins, and its ability to communicate.

Quality

in the musical outcomes should be a significant driver: not just accepting something that merely 'keeps together', but looking for music that has care, shape, balance, a sense of being magical and communicating strongly to the audience.

Music making

learning how to develop practical skills in order to sing, play and make music confidently with others and on their own.

Supported by specific practical skills:

singing, playing individually, playing in an ensemble, composing, arranging, improvising, using music technology.

Creativity

should be at the heart of the learning process, both in terms of the learning strategies employed by the teacher, and in the music making challenges the students need to engage with.

Learning should incorporate the use of both acoustic sounds and music technology; and enjoyment should be an essential attribute of all lessons!

Figure 6.3 A model of learning for KS3 Music, Hampshire Music Service (Rogers, 2015)

and then performing one of his songs, the focus would be on developing further understanding of melody and harmony, using a focused genre as the vehicle. Were Reggae to be that vehicle, a unit of work could take shape in which students learn about a chord pattern and how a bass line fits with it as a riff; develop their understanding of harmony, potentially transposing to a key more suitable for their and others' voices; gain further knowledge of the connection between a melodic line and harmony (together with an understanding of consonance and dissonance and the expressive qualities of both); and harness this knowledge to compose in a Reggae style (stressed off-beats, relaxed tempo, strong bass line and so on). Through teacher modelling and – crucially – listening to well-chosen, authentic examples they assimilate the style by imitating what they hear and gradually making it their own. Together as a class, they will explore the cultural context of Reggae – not just knowing a bit more about geography and the names of the principal musicians and bands but, in the hands of a good teacher, developing a deeper consideration of music's role in society and politics around the world.

Depending on where this unit of work lies in the timeline of the curriculum, it may well be that attention is given to hand positions on the keyboard or guitar – knowledge of the mechanics of playing – and consideration given to how to practise this. The aim is not to replicate the ABRSM Grade structure referred to previously but to develop technical understanding of what is necessary for this specific task. Having practised singing and playing as a whole class, using carefully chosen model material in which everyone can participate with fluency, the next stage would be to work in smaller groups. Here, further practical knowledge is necessary, specifically how to pace a rehearsal, share ideas, balance dynamics, deal with issues of co-ordination and so on before students even start to compose a piece together. In some cases, the most important skill may even be knowing how to start and finish together.

Successful musical group work, like any collaborative endeavour, depends on individuals using their interpersonal skills to listen to, give and take criticism in ways that encourage rather than discourage and to be generous in offering suggestions while leaving time and space for others to respond and offer suggestions of their own. In the case of music, however, pupils also need to attend to the musical performances of each group member. As with PE and games, there is no knowledge and skills dichotomy in music. Steven Berryman considers this further when he writes:

> The nature of musical learning and musical knowing interfaces between knowledge and skills in a very distinct way. When we use a

musical skill, such as singing, we are drawing on knowledge of how to use our voices, which might include knowledge of how to manage our breath control or knowledge of how it feels to sing loudly and how to sing quietly. Musical knowledge is often embodied knowledge rather than factual knowledge, such as knowing the dates of composers' deaths. Particular knowledge is required to demonstrate musical skills, and, in turn, new knowledge will be created through the use of the skills. (2018: non-paginated)

We could expand on this and posit that purposeful music making results in the creation of new knowledge. That ought to put curriculum music in a powerful place within a school.

The advent of the knowledge-rich curriculum, therefore, ought to sharpen our minds regarding the purpose and role of curriculum music, and we should be clear about what musical knowledge is. And it needs to be equally clearly articulated. There are some red herrings around too. In his editorial for the *British Journal of Music Education*, Fautley expressed his concern that proponents of a knowledge-rich curriculum often define 'knowledge almost entirely as being declarative knowledge, with facts being at the centre of these. Skills … are either downplayed or discredited. But this narrow view of a knowledge-based education system is predicated on constructs which we in music education have no problem reconciling' (2018: 1). Whereas skills in music are complex, as they 'often also have a physicality, embodiment, or musculoskeletal component, in which feeling the music, its beat at the very basic level, involves more than simple recall. This distinguishes the skill of playing a musical instrument from, say, the skill of long division' (2018: 1).

There is also a danger that musical knowledge may be defined as a repertoire of pieces that students should 'know'. Apart from the fallacy of assuming that any human being can ever truly 'know' a piece of music, this is akin to defining sporting knowledge as being able to recall the score lines of the most celebrated cricket, football and rugby matches – sporting statistics are fascinating and watching matches of the past can be both instructive and enjoyable, but this is a different kind of knowledge.

Rogers' description of musical understanding as getting to know how music works, and how it thereby conveys its meaning, should be at the centre of curriculum music. Listening actively to great works of music, and being able to respond using critical vocabulary that begins to explain our emotional and analytical response, is an essential part of the classroom music; translating this into creating one's own music – handling sound – with increased and informed application of

compositional techniques is part of the same process. This is an altogether different process from remembering composers' dates, isolated from an understanding of their cultural context, or learning how many children J.S. Bach fathered. Berryman (2018: non-paginated) writes, 'Prioritising knowledge of music can lead to lessons about music that are not distinctly music (or musical) lessons.' This one hour per week of classroom music must be a musical experience setting students up for life, rather than preparation for the pub quiz, if they are to be *music* lessons rather than lessons *about* music.

Music lessons, therefore, are places where musical knowledge is applied, whether practically through performing or rehearsing, conceptually through composing or critically through speech and writing. When John Finney (2014) articulates what he believes to be the purposes of curriculum music, he notes the difference between 'knowing how to' and 'being able to' do something: this not only raises the importance of informed, critical listening (perhaps the true aim of music education in the longer term) but avoids the trap of imagining that the curriculum music on its own will lead to expertise on an instrument.

Similarly, the first draft of the proposed Department for Education (DfE) model music curriculum describes students developing 'a cumulative knowledge of musical components, i.e. being taught about the features of …'.[1] Taking harmony and tonality as an example, an expectation would be that by the end of Year 9, students will know about consonance and dissonance, root notes, major and minor chords, primary and secondary chords (in major and minor keys), tonic and dominant, perfect cadence, inversions, 7th chords, 9th chords, other extended chords, diminished chords, suspensions, pedal notes, major, minor and pentatonic tonality, more adventurous keys (two sharps, two flats), modes and atonality. Of course, they will already be listening to music that features all of these aspects – the role of curriculum music here is to develop their awareness of them over time through focused listening, composing and performing (better expressed through Rogers' 'music making' and 'music thinking'), rather than depositing a check list of abstract terms on them.

A similar approach should be taken with notation. There has been considerable debate of late about the role of staff notation within the classroom, which space does not allow us to explore here other than to reinforce the principle that *its application* is the reason to teach notation. There is no space in curriculum music for theory lessons for their own sake – music exists through sound, and we teach staff notation to allow students to experience more music and to do so ultimately without the

need for a teacher. Fautley advises that it may be better to refer to 'speaking', rather than 'reading', music:

> This is because whilst a learner may be taught to decode letter names and note lengths, recognising a dotted quaver D, followed by a semiquaver D, then a bar line, then three crotchets E, D, G, then another bar line, then a minim F#, is good and useful as declarative knowledge. But it is meaningless if the 'reader' is asked what song begins like this, and then cannot name *Happy Birthday*! To do this they have to be able to speak music, not just read it. (2017: 123)

Curriculum music: Content choices

There is plenty of excellent guidance available for music teachers designing their own curricula (including the Incorporated Society of Musicians' recent Framework for Curriculum, Pedagogy and Assessment in Key Stage 3 Music), but this rarely explores the topics, genres or musical works that could be studied. The current National Curriculum prescribes that all students should listen to 'the best in the musical canon' and 'the works of the great composers and musicians' (DfE, 2013: 1) but no examples are given. To some extent, this is so that the expertise and enthusiasms of the specialist classroom music teacher can be harnessed in the classroom – a music teacher may be a rock guitarist, a pianist, an orchestral player, a choral conductor, a band leader or a folk singer, for example, but very rarely all of these, and so the curriculum should play to the musical strengths of the teacher – but there is also a fear of imposing one musical genre to the exclusion of others. Issues around 'relevance' are widely discussed.

However, with only one hour each week, choices must be made. If the intent of the music curriculum is as promoted here – namely, getting to know how music works and how it conveys meaning – then this is the relevance of the musical curriculum, and the choice of genre and musical works serve this knowledge. This is about moving students' musical understanding from an immediate, passive response (usually focused around liking or disliking a piece of music) to being able to engage with music in multiple genres with a depth of musical and cultural knowledge born out of repeated and varied practical experience.

Students will enjoy this approach to these lessons because their musicianship is developing, rather than for any reasons of fashion or

trendiness. A quest to please students through spending a term focusing on the music a teacher imagines they will like is almost always doomed to failure, more often than not because the music chosen offers limited scope to teach the musical content of the curriculum framework. Equally, there are many areas of classical music that, though extraordinary, would not be effective as a vehicle for musical learning at Key Stage 3. Certainly, an essential aspect of music teaching pedagogy must be sparking interest in music that students have never previously experienced, but that is not the principal focus of the curriculum – which is to develop students' musical understanding in a thorough, organized manner.

An effective approach to a unit of study, lasting a term, is one of five stages in which understanding becomes progressively more informed and prior knowledge is brought to bear, namely:

1. Experiencing stimulus material through performing and exploration
2. Understanding the key musical 'ingredients' including cultural context
3. Improvising (gaining confidence in handling the musical ingredients) within the style of the genre, informed by further listening/performing
4. Composing within the style of the genre, informed by still further listening/performing
5. Presenting a final composition/performance/recording/piece of written work as appropriate

Thus, music of the classical era could form the basis of a unit, developing students' understanding of balanced phrasing, tonic and dominant, consonance and dissonance, cadences, bass lines, accompaniment figuration, melodic decoration – an effective opening task is performing the opening of *Eine Kleine Nachtmusik* as a class, then composing a 'Welcome March' for keyboard similar to 'Salieri's' composition in the film *Amadeus*. Having selected this as a focus, there could be a guided exploration of some of Mozart's piano works (e.g. *Rondo alla turca*) and operatic writing (e.g. *Non piu andrai*), with features of these works feeding into the students' compositions.

Similarly, an effective way of developing students' handling of rhythm, texture and timbre, harnessing music technology, is to focus on minimalism. Works by Philip Glass, Steve Reich and Michael Nyman are especially effective as musical inspirations; Reich's *New York Counterpoint* and *Electric Counterpoint* in particular provide an understandable model

on which students can model their compositions; the connections with art and literature are worth exploring; and the use of minimalist music in films provides an inspiration to many students, as well as offering a further route for them to develop their musicianship in the future.

Exploring the expressive potential of the human voice should be a thread running through the whole curriculum, and students' facility on instruments should be influenced by this study. A unit on folk song, for example, probably in year 7 (ages 11–12) would ostensibly be one in which whole class singing is developed, and the teacher would use the source material to develop the students' vocal timbre and imaginative response to the text. One of the most problematic aspects of singing in the curriculum is when all the students do is slavishly copy the teacher through rote repetition. Singing should be about unlocking student voice in all its aspects. However, using this model, the real focus of the unit would be developing an understanding of scales and modes, melodic contours, simple accompaniments, and the pull of the tonic, with students writing and performing their own folk-inspired songs.

A suitable end of the Key Stage 3 musical journey is for students to perform and compose in a 'Battle of the Bands' event or produce a class album, or for the whole year group to mount production in which every student has a meaningful role. The focus for this should be that the cumulative musical understanding built up through the curriculum is applied in an authentic musical setting. In other words, students act as musicians. The overarching principle behind this approach to the curriculum is that the development of musical understanding is the focus and is explored through a genre – not vice versa. Further examples of this approach will feature in the forthcoming Model Music Curriculum, and the Music Teachers' Association is committed to providing resources to support this.

Musical knowing

The musical classroom, therefore, should be one of the most knowledge-rich places in the school. Finney (2018) describes the various aspects of musical knowledge as being knowledge as experience, embodied, practical knowledge and knowledge created through the imagination and pedagogic relationship between teacher and pupil. Music, he reminds us, is closer to a human practice than a body of knowledge conventionally, and narrowly, defined. To enter a rehearsal space of a musical ensemble at the top of its game is to experience this human practice at its most

potent, with individual technical skill and imaginative musical thought shared creatively, in the musical moment, to form a unique, focused ensemble identity. A school music curriculum must aim to allow all students to experience this.

Of course, there is much in music and the arts that is *not* creative, and much in mathematics and science that *is*. Mechanical, technical practice; learning music whether by heart or from the score; harmonic analysis – these are not in themselves creative, though we can bring creativity to bear to make the process more painless. We can do the arts a disservice by referring to them lazily as spontaneously creative and in so doing deny the immense craft and skill, and the sheer number of hard hours' slog, inherent to them.

However, Finney's statement about creativity allowing for knowledge to be made cuts to the very heart of the musical process itself – namely, the moment a composition, whether written 400 years or 15 minutes ago, is performed live, at that very moment the performance *is* the music. Whether that is the Choir of St John's College, Cambridge, performing a Bach cantata, Simon Rattle conducting the London Symphony Orchestra in a Bruckner symphony or a Year 7 class singing a Shetlandic folk song, new knowledge is being created at that moment as a result of the creative process. The same happens in sport with every new game that is played. And the human practice that Finney recognizes is present in every moment of music making. This is something that all in music education should be celebrating.

This does not happen out of thin air through an inspirational teacher sprinkling musical magic dust on the class – it is through the process of engaging with musical knowing, that rich human practice, in every music lesson. Finney (2014) describes three 'knowings' and suggests these as the purpose of curriculum music:

1. Knowing how to make music well
2. Knowing musical practices with critical insight
3. Knowing how music enriches the inner life

This gives welcome clarity not only to why curriculum music matters and why it should have a place in the curriculum and be available to all pupils (Paynter, 1982) but also how a purposeful, knowledge-rich music curriculum supports instrumental and vocal tuition, musical ensembles and school concerts and musical events. In so doing, it is absolutely central to school life.

Conclusion

Classroom music can too often exist in a vacuum, occupying space in the timetable because everyone values music itself but without widespread understanding of its value as a subject discipline in the curriculum. Even those who do express belief in its value can often justify its position in the curriculum as merely providing a counterbalance to the demands of 'the academic subjects'. Music's poor take-up at GCSE and A level only serves to reinforce this outlook.

And yet, when taught well, music can be the vibrant heart of the school – not just through the impact on students' well-being through ensemble music making; or the strong sense of community, ethics and values through performances in assemblies, evening concerts and around the local area; or the promotion of disciplined approaches to learning through individual instrumental and vocal achievements; but through the purposeful intertwining of knowledge and skills in the classroom, rooted in cultural awareness, progressively leading to deeper, applied understanding.

There is little doubt about the amount of time that is necessary to develop technical fluency on an instrument or the number of hours of rehearsal time needed for an ensemble to produce a confident performance. The same approach needs to be adopted for curriculum music. Music teachers should be clear about quite how much content there is to teach and to learn and its nature.

The debate about what constitutes musical knowledge and what is understood by skills is fascinating, but potentially never-ending, and does little to help the music teacher with Year 9 on a Friday afternoon. Fautley's (2019) question about the purpose of classroom music, therefore, needs answering.

Musical learning in the classroom should be the living embodiment of the term 'knowledge-rich', as exemplified by Finney's (2014) clear articulation of the varieties of musical knowledge. The teacher develops students' existing musical knowledge through making music of increasing complexity and diversity, understanding its constituent parts and responding with increasing depth and awareness of their own emotional responses. Musical knowledge is continually applied, whether practically through performing or rehearsing, conceptually through improvising or composing, or critically through speech and writing. The legacy of curriculum music is in developing in all students

an understanding of music, in all its wonderful richness, which will continue to grow and nourish them throughout their future lives.

That one hour per week of music in the classroom is precious, and there is now an urgency for the world of music education to shift its gaze from abstract theory to the practical facilitation of teaching of worthwhile, vibrant lessons full of musical knowledge. As Émile Jacques-Dalcroze wrote:

> Before everything else, always make sure that the teaching of music is worthwhile. And there must be no confusion as to what is understood by 'music'. There are not two classes of music: one for adults, drawing rooms, and concert halls, the other for children and schools. There is only one music, and the teaching of it is not so difficult a matter as scholastic authorities are apt to suggest at their congresses. (1921: 168)

Note

1   This quote is from the opening page of an unpublished August 2019 Department for Education draft report, for which I was part of the advisory group.

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7
Foreign languages

Shirley Lawes

The unique value of the apprenticeship in the foreign language is that it takes learners on a voyage of discovery, comparing the known with the unknown in terms of both language and culture … It challenges parochialism and invites us to question, opening our hearts and minds to the real challenges of difference. Out of such a questioning may come a greater understanding of who we are and what we value.

(Eric Hawkins 1999, *Listening to Lorca*)

Language is fundamental to what it means to be human. It is everywhere around us, acquired from birth, seemingly naturally, and mostly taken for granted. It is through language that we come to know the world, how we communicate human thought and endeavour. By extension, when we learn another language, we open a new window on the world through a unique body of linguistic and cultural knowledge. Foreign language learning may or may not have practical application, but rather, it is argued here, should be seen as an essential part of the education of every individual. Knowledge of a foreign language has the capacity of widening peoples' horizons and to break down barriers between people from different countries and cultures. This is the central argument for foreign language learning in the English-speaking world where the *lingua franca* is already spoken.

Learning another language is a substantial enterprise that must necessarily be planned incrementally and made manageable if we are not to drown in an ocean of words. The study of language as an object in its own right comprises knowledge of language, knowledge and understanding both of the structure of the language itself and of the social, historical and cultural contexts in which it has been and/or is currently used and, in some circumstances (e.g. in the university), drawing upon

allied disciplines such as linguistics. Learning a foreign language necessarily involves an initiation into the culture and cultural achievements of the country or countries where the language is spoken. The body of knowledge that constitutes a foreign language is therefore complex, and the essential relationship between language and culture presents us with a dilemma: is knowledge of language a precursor to initiation into culture? Is it possible to have cultural knowledge and understanding without knowledge of the language? Or alternatively, how can knowledge of language and culture be interwoven and presented as mutually informed and of equal importance?

It is perhaps useful to make some distinctions regarding what we mean by 'culture' within the discipline of foreign languages in education. In recent times, the word has been more generally understood in the field as referring to the everyday life and traditions of a country or countries where a language is spoken – a sort of 'ethno' culture. What is usually known as 'high culture', including literature, poetry, art and film, is rarely taught to the majority of pupils. Thus, the essential relationship between language and a deeper understanding of culture in the subject discipline is lost. How and why this might be so is explored here.

Foreign languages and social change

Until quite recently, foreign language learning was the preserve of the few and was an academic, intellectual exercise. English literature offers numerous historical examples of upper-class young adults studying foreign grammars and literature, engaging in stilted conversations with native speaker tutors in preparation for their Grand Tours of Europe. But more importantly, over the centuries, knowledge of a foreign language was an intellectual imperative for scholars eager to engage with the ideas and thoughts of speakers of other languages. As the vernacular took over from Latin as the language of scholarly texts, so the need for scholars to know other languages became important. At this point, the ability to read and understand a text in a foreign language was how 'knowing' a foreign language was understood. A thorough knowledge of grammar was seen as essential, and translation of literary or scholarly texts was the method of teaching. Scant attention was paid to oral communication. Many scholars were self-taught, but as time went by, initiating others into the language increased and thereby the need to develop written expression as a means of communication among the intellectual and upper social class grew. The need to communicate orally

only developed as it became a political imperative between trading nations and as travel abroad as a leisure activity of the rich increased in the eighteenth and nineteenth centuries. Throughout this period, however, the initiation into another language was assumed to be an initiation into another culture because the process took place entirely by means of studying the admired and respected scholarly texts of the time.

In *Lessons in French*, published in 1896 by Cassell, the author Louis Fasquelle set out a systematic and highly detailed introduction to the language in a series of lessons 'proceeding gradually from the most simple to those which are more difficult and leading the student gradually and insensibly to a knowledge of the structure and idioms of the language' (1896: v). Explanations were accompanied by hundreds of sentences to be translated to and from French. The second part of the book 'contains a Systematic Grammar of the French tongue, including its Etymology and Syntax, each rule being illustrated by passages from the most distinguished of French writers' (Fasquelle, 1896: v). All elements of French grammar were itemized and fully explained. This volume is a fine example of the scholarly 'practical as well as theoretical introduction' to foreign language instruction through foreign language texts. It epitomises what became known as the Grammar-Translation Method. This approach to foreign language teaching prevailed until the period following the Second World War when new needs and functions of foreign language learning began to evolve.

One example, perhaps the most well-known new methodological development after the war, was the Army Method, introduced in the United States in the late 1940s to enable troops stationed in post-war Germany to communicate more effectively. The method was an intensive training programme, inspired by B.F. Skinner's insights in the field of behavioural psychology. It involved intensive drilling of basic sentence patterns of language, that is, the rote learning of selected phrases. Little or no attention was paid to the grammar of the language; the aim was to introduce foreign language learning at a functional level on a large scale. This important example indicates a new purpose for foreign language learning, involving a shift in thinking towards functional aspects of language for communication purposes rather than as enabling access to other cultures and ideas. Slowly, developments outside education began to influence educational thinking, and foreign languages as a subject discipline within the school curriculum was gradually transformed.

In 1963 the Newsom Report described the situation in which languages were taught primarily in grammar schools and only in about half of secondary modern schools, mostly to the top third of the ability

range. The mid-1960s heralded a time of dramatic changes. The first of these was the introduction, over a decade, of comprehensive education. The impact of the comprehensive reorganization of secondary education was particularly great in the field of foreign languages teaching. As Alan Moys observed, 'In no subject area in the curriculum can the change to comprehensive education have been more fundamental in its demands and aspirations than in modern languages' (1996: 83). Many teachers who were used only to teaching the most able pupils found it a daunting task to be faced with a much wider range of ability, and often more unwilling learners. Work in a comprehensive school required them to adapt their teaching to an entirely different situation and to rethink the aims, objectives and content of the courses that they offered their pupils.

If the pressure was mounting at this time within education to change radically how foreign languages as a subject discipline was understood and interpreted, external pressures were equally important. From the 1950s and 1960s, foreign travel was no longer the preserve of the rich; it was at this time that the mass holiday market, notably to Europe, was born, and thus, it was perceived that there was an instrumental purpose to the teaching of foreign languages in school. When the United Kingdom became a member of the European Economic Community (EEC) in 1973, a new era for foreign language learning was born. Although by that time the majority of 11-year-olds were learning a foreign language, usually French, in secondary school, the subject area was still seen by many as academic and elitist. Membership of the EEC raised awareness and concerns outside the education community about the United Kingdom's poor overall language capability and fears were expressed that opportunities would be missed to reap full benefit of EEC membership. In 1976 Prime Minister James Callaghan launched 'The Great Debate' on education in a landmark speech at Ruskin College, Oxford, in which he identified 'the need to improve relations between industry and education' (Maclure, 1988: 169). The idea that foreign language learning might have a practical use for more than a very tiny portion of the population was a further challenge that raised issues of what should be learned and how. Importantly, the Ruskin College speech indicated for the first time that education should be linked to the needs of the economy and that educational decisions should not be left only to educators: government and other interested parties had a role to play in educational decision-making.

The combination of membership of the EEC and the shift in the relationship between education and society had a further impact on how the subject discipline of foreign languages was understood. Firstly, for

foreign language teachers, membership of the EEC signalled a possible change in attitudes towards language learning and the development of new pedagogical approaches. New opportunities for job mobility in the EEC that many people envisaged led many teachers to believe that learners might see foreign languages as more attractive and relevant if they had a vocational purpose. The perceived value and purpose of foreign languages began to change quite rapidly. These changes were accompanied by developments in second language research (see Mitchell and Myles, 1998) and language teaching methodology (see Hawkins, 1996; Jones, 1994). Over the next three decades what constituted the subject discipline changed radically and a contingent relationship between foreign language learning and the economy began to develop.

The imperative to respond to a new school population as well as social and political changes led both teachers and policy-makers to see foreign language teaching and learning as a more 'useful' activity. While literary texts were still studied at Advanced level by relatively few pupils, the rest of the curriculum became more focused on communication and as such the vital link between language and culture was gradually eroded and the subject discipline transformed. During this period, developments in technology, research and intellectual thought, as well as social and political developments, combined to give rise to a new method, the audiolingual (AL) and audiovisual (AV) approaches, involving the use of tape recordings, film-strips, visual aids and language laboratories. Repetition and rote learning of set phrases were the essence of these approaches, with an emphasis on the use of the third person. Where these methodologies differed from the Army Method was that grammar structures formed the basis of rehearsed utterances and drew on the theoretical work of structural linguistics. The content of language learning become much more focused on everyday language in everyday settings (see, for example, the French course *Bonjour Line* published in France in the early 1970s or *Le Français d'Aujourd'hui* in the United Kingdom).

It was hoped that these would be a solution to facilitate the teaching of foreign languages across a broader ability range. As Johnson points out, the method laid claim to being 'scientific' and 'new' in that it 'based itself on a combination of the new "science of language" (structuralism) and the "science of behaviour" (behaviourism)' (2001: 87). The spoken word was emphasized more than the written word in the early stages of learning and as a result the target (foreign) language was used more in the classroom, although grammar remained a central concern. However, the new methodology proved unsuccessful with less academic pupils.

Teachers found it daunting to make languages accessible to all levels of ability and lacked the pedagogical knowledge to make the new methods successful. The abandonment of cultural knowledge in favour of linguistic 'skills' in order to make foreign languages 'more accessible' had the effect of robbing the subject discipline of a defining feature and emptied the study of foreign languages of its intellectual content.

From the 1970s onwards the perceived purpose of learning a foreign language was reassessed, moving from an intellectual pursuit for the more able to a skill that should be made accessible for all. The development of Communicative Language Teaching (CLT) continued throughout the 1980s and 1990s with a focus on languages for communication, 'authenticity' of task and materials, 'relevant' content and minimal focus on grammar. The principles and practice of CLT has become the methodological orthodoxy with important consequences for the meaning of the subject discipline. Critics argue that the particular form of CLT developed in the United Kingdom, characterized by topic-based syllabuses, performance objectives and much pupil interaction, trivializes foreign language teaching by placing too much emphasis on the use of 'fun' activities and games. Little serious attention has been paid to grammar. Over the last 20 years or more, the subject discipline of foreign languages has been emptied of cultural content, with the effect of reducing foreign language learning to a 'get by' toolkit of transactional and 'survival' language. Even the small proportion of pupils who continue to learn a foreign language beyond the compulsory minimum acquire very little cultural knowledge, and thus, the 'window on the world' is shut.

Foreign languages as a school subject

It is true that every subject discipline has its own difficulties and specificities, but foreign languages as a school subject may be seen as having unique features that distinguish it from other subject disciplines. Firstly, the introduction of foreign languages in the primary school notwithstanding, a pupil's exposure to a foreign language as part of their lived experience is much less than other curriculum subjects. Secondly, the foreign language classroom is likely to be the only exposure to the language that most pupils experience. Even with the much increased availability of foreign language and culture through the internet, without the support of the teacher or a fluent speaker, understanding is very limited. Thirdly, language learning necessarily involves language production in both oral and written forms, but this is necessarily limited

and does not allow pupils to express ideas freely. Finally, cultural learning may encompass a number of other subject areas such as literature, art, film and history and the conventions of those cultural forms must also be learned alongside the specific cultural knowledge. So, for example, to learn about *La Nouvelle Vague* in French cinema tradition involves familiarity with the cultural context, aspects of film narrative and the specifics of film as an art form – all expressed in the foreign language.

A further consideration that is often ignored by non-linguists and particularly school leaders is the fact that each foreign language is a distinct subject. Indeed the label 'Modern Foreign Languages' is misleading, in the same way that it would be wrong to suggest that all science subjects are the same. Each language has a distinctive and unique structure and body of knowledge. Without getting too deeply into the comparison, it is sufficient to assert the distinctiveness and uniqueness of German from French or Spanish, for example, in terms of culture as well as language, while at the same time acknowledging commonalities. Equally, what constitutes the subject area of Modern Foreign Languages in the United Kingdom is subject to change while retaining an element of tradition with French, German and Spanish forming the core of the languages curriculum. So-called 'heritage' languages have become part of the languages portfolio of many, particularly urban, schools. Welsh and Gaelic are now firmly embedded in Wales, Northern Ireland and Scotland, often as the medium of instruction of other curriculum subjects. Moreover, other non-European languages have featured in the curriculum of a minority of secondary schools over the years, reflecting passing economic or cultural fashions. Russian, then Arabic and also Japanese have all had their moments of popularity and now Mandarin Chinese is in the spotlight. A high level of investment and political support has created much interest in Chinese and an increasing number of schools are now offering the subject up to GCSE level with some to A level. The case of Chinese is particularly interesting in terms of distinctiveness, from both a linguistic and a cultural perspective. The challenges that the language presents to both teachers and learners in UK schools are underestimated and the specificity of the pedagogy is poorly understood and under-researched. However, the linguistic and cultural richness of Mandarin Chinese is undeniable.

Alongside the specific and distinctive features of particular languages and their cultures, a body of pedagogical principles and knowledge has been developed in the subject area that can be applied and adapted to a greater or lesser extent to all foreign language teaching in schools. To begin with, it is generally understood that while English

may be used to some degree in the foreign language classroom, unless pupils have maximum exposure to the target (foreign) language, they are unlikely to achieve confidence, fluency and spontaneity in their use of the language. The commitment to target language use remains a thorn in the side of the language teacher and is an ongoing contentious issue (see Pachler et al., 2007, for a full discussion of the place of the target language in the foreign language classroom). Suffice to say here that teachers' beliefs and practices in relation to target language use are influenced primarily by their own confidence in their subject knowledge and/or their attitudes towards and expectations of their pupils.

If we draw on insights gained from second language acquisition (SLA) theory, particularly following Stephen Krashen (1981) and Krashen and Terrell (1983), that have been absorbed into practice, we must conclude that how we purposefully learn a foreign language in a school context differs from how we acquire language as a small child or in an immersion situation but that there are also similarities. In school, knowledge is prescribed by the curriculum at any given time, and therefore what constitutes foreign language teaching and learning has changed considerably over time.

Knowledge and use of a foreign language are generally understood to comprise knowledge of its grammar, that is, the structure of the language and the rules that inform its use, together with its lexicon. The study of grammar goes back to early times. It was, and to some extent still is, seen as a scholarly pursuit and this has contributed to the apparent mystifying of foreign language teaching in formal settings. Arguably, it is not so much the set of rules that frame a language that is difficult, but it is how those rules relate to language use and how language is manipulated within a grammatical framework that is the challenge. Knowledge of grammar helps us to make sense of the language so that incrementally we are able to generalize across the language from a skeletal set of rules and therefore develop our understanding of how the language works. It is not sufficient, therefore, to learn a grammatical rule. It is also necessary to assimilate how it is used and to know how to re-formulate and then re-use it in a variety of contexts. The vocabulary and colloquial and idiomatic language, together with syntax, types of register and social context, are all elements that bring the grammar to life and enable the learner to communicate at first in simple and then in increasingly complex forms.

Learning the structure of a language and how to use and manipulate it in both speaking and writing is progressive and very much a process of sequential building from a solid foundation through intermediate

platforms, which are defined in the English National Curriculum as Key Stages. The four so-called 'skills' of language – listening, speaking, reading and writing – are the means by which communication takes place and language is put to use. These 'skills' are informed by the linguistic systems (pronunciation, morphology, syntax, vocabulary, idiom) characteristic of the language. The acquisition of knowledge of these systems, together with the practical implementation of that knowledge, is a vital component of cumulative language learning, in which learners acquire a command of the pronunciation, grammar and vocabulary of the foreign language, including idiomatic usage, which enables increasing accuracy, fluency, coherence and range of expression in speech and writing. The word 'skill' has become a shorthand for describing the linguistic knowledge and abilities we develop as we learn a language, but it is a seriously reductionist misnomer. We should never underestimate the complex cognitive processes in operation in the language learning process and in the production of language.

Mastery of all four elements of language reception and production is the ultimate goal of language learning although clearly there are a number of stages along the way. Learning a foreign language does not fit comfortably in an 'outcomes'-driven curriculum where short-term goals and 'evidence-gathering' prevails. The idea of 'mastery' as a long-term aspiration has been seen as irrelevant to the vast majority of learners. But it could be argued that the pursuit of mastery does not necessarily exclude the majority of learners; it simply establishes the belief that all pupils can achieve basic communicative competence, knowledge of grammar and aspects of culture.

Theory and foreign language learning

Applied linguistic and second language acquisition theory is extensive although disparate; it can in no way be considered as a coherent body of knowledge but more as an eclectic, thematic range of research-informed theoretical insights that may or may not inform our understanding of formal teaching and learning. The field is too vast to do justice to here, except to note trends in theoretical thinking and research. Historically, prior to the 1950s and 1960s, behaviourist theories dominated, but these were strongly challenged in the second half of the twentieth century, not least by the development of structural linguistics, by Noam Chomsky's prolific work and highly influential Universal Grammar theory (1986) and by a growing body of psychology-based research on language

acquisition theories and connectionism. Krashen (1981; Krashen and Terrell, 1983), in a substantial body of work that continues to the present day, has been highly influential on pedagogical practice in the field of second language acquisition research. He identified what is now an established distinction between language acquisition (how we learn our first language through constant exposure) and language learning (the purposeful, systematic study of a language in a formal context) and advocated that formal language learning should replicate as far as possible the process of language acquisition. Krashen's work contributed to the view that the content of foreign language learning should teach pupils to communicate about the world around us rather than be a vehicle for accessing cultural knowledge.

The 1990s also saw the introduction of sociocultural theory, an approach to explain second language acquisition in terms of the social environment of the learner. This drew on the earlier work of Lev Vygotsky, although sociocultural perspectives are often considered to be a distortion of Vygotsky's work and may be seen as an expression of linguistic relativism. Sociocultural language theories challenge the assertion of cognitive science that certain universal categories underlie all human thought. The challenge to Chomsky's Universal Grammar, in sociocultural terms, is based on the idea that language shapes how we think and that the language a person speaks has an influence on his or her cognition and world view. The assumption of Universal Grammar is that language and its use can be dissociated from social context. Competing theoretical views on language learning remain unresolved, and while Rosamond Mitchell and Florence Myles considered in 1998 that 'the fundamental assumptions of second language learning research by and large have remained those of rationalist "modern" science' (1998: 191), they point to two prevailing discussions of theory in second language learning at the end of the twentieth century: what Block saw as socially meaningful second language acquisition research (Block, 2000), on the one hand, and post-modern interpretations that offer a relativist critique highlighting problems of 'textuality' and the relationship between language and any possibility of external meaning, on the other. Mitchell and Myles conclude that:

> So far, however, the critical and post-modern commentary on SLA has not dislodged its central modernist assumptions. It will be for the future to tell how much impact it eventually makes in programmes of L2 empirical enquiry; this evolution will evidently be linked to wider on-going debates in the social sciences. (1998: 194)

Mitchell and Myles remained optimistic, but the trend towards linguistic relativism seems to have continued, fuelled in no uncertain terms by interpretations of general neuroscientific insights that may currently provide somewhat uncertain explanations for the language learning process.

Restoring curriculum content to the subject discipline of foreign languages

The body of knowledge that constitutes the discipline of foreign languages has become 'a moveable feast' and is disputed. As Rowlinson points out, 'Language teaching, like all other teaching, reflects the temper of the times' (1994: 7). We have seen how, in recent times, differing and contested views of what constitutes the subject discipline have changed in relation to the value and purpose placed on foreign languages in the school curriculum driven by the vagaries of educational policy, which, in turn, reflect changes in society more generally. The diminished role of cultural knowledge in foreign languages as a school subject has led to an impoverishment of the subject discipline. When language and culture are separated, language learning becomes a sterile pursuit unless a directly instrumental motivation is present. In order to fully understand the meaning and implications of aspects of language, cultural insights are essential. The significance of particular words or expressions may be culturally specific; idioms often have cultural meanings. At this 'ethno' cultural level, it is important to know about the customs and traditions of a country in order to fully understand linguistic meaning. Cultural comparisons of aspects of people's daily lives, work and leisure are of interest and enable us to better understand other cultures and can lead us to reflect on and gain a deeper appreciation of our own. Exposure to other cultures and civilizations is an essential element of liberal education and the quest to educate the whole person who is broadminded and tolerant of other ideas and ways of living. American Professor of Sociology Donald Levine suggests that learning about other cultures forces the student to 'confront the peculiarities of his own conception of the world by confronting the peculiarities of other such conceptions', thus enabling one to overcome the biases in their native subculture (2007: 164).

For some people, cultural knowledge of this sort can clearly be gained by travel, but also through other cultural forms, particularly films and novels that provide a richer context for understanding the lives

of others. However, this interpretation of the subject discipline is still limited and limiting if the cultural achievements of countries are not explored for their own value, in their own right. If cultural resources are used progressively from the very beginning of foreign language learning, by the time pupils are working towards GCSE and then possibly A level, they will be familiar with many aspects of the target culture through their language learning. We thereby establish the educational value of foreign language learning that goes far beyond the narrow instrumental focus of examination preparation that we often see dominating the secondary foreign language classroom.

The need to restore the relationship between language and culture, in the sense of 'high culture', is indeed easier to assert than to carry out in practice. The essential prerequisite would be a belief in the value of cultural knowledge and a rejection of the instrumental purposes of foreign language learning that currently prevail. This does not imply that foreign language learning should be restored to its 'elitist' position of the past, nor that we should abandon transactional language, but that we should consider carefully how language can be taught through cultural content right from the beginning of foreign language learning. For young learners this would indeed mean some 'ethno' culture, comparing the lives of others with their own, but it could also mean looking at and talking about paintings in simple terms in the foreign language and learning songs and poems and traditional rhymes and stories. In some classrooms this already happens, but far too infrequently and often abandoned in favour of 'serious' language learning. Working with film, particularly short film, is an engaging and effective way of introducing pupils to an accessible cultural form (see Carpenter et al., 2016; Christie and Lawes, 2017). Clearly, every film is a product of a cultural context and its meaning lies to some extent within that context; it provides us with unique cultural insights. But more broadly when we teach film, as when we teach a work of literature, we would also expect to extract and explore universal themes and global images that illuminate contrasts and commonalities between particular contexts and that provide the learner with a special kind of cultural knowledge. The foreign language is the medium through which pupils can explore film, learning to view, that is to know about film narrative, as well as viewing to learn. The technology now readily available to teachers makes the exploration of film as well as other authentic cultural artefacts (such as paintings, geographical sites, historical themes, cultural icons) easily accessible. *How* they might be explored requires subject-specific pedagogical knowledge and imagination.

Novels and works of literature, particularly short stories and poems, can be introduced from early on in foreign language learning, possibly as extracts. For example, in a Year 7 Spanish lesson I observed recently, the teacher was introducing the well-known nineteenth-century poem *La Pobre Viejectita* by Rafael Pombo. The language of the poem was quite simple; some of the vocabulary had been previously learned and new words were practised in context. The class then watched an animated short film of the poem. The teacher stopped the film at several points to ask questions about the narrative and to invite predictions about what would happen next. Simple vocabulary building, use of the immediate future and descriptions – standard grammar learning – were taught through a cultural resource that was stimulating and challenging. Pupils engaged readily, were eager to express themselves and were able to reconstruct the text of the poem line by line at the end of the lesson and finally translate it orally into English. The lesson was well crafted, drawing on strategies and activities familiar to foreign language teachers but what was distinctive was the content: a poem. Teachers often baulk at breaking away from the textbook or an exam-orientated curriculum for fear of not 'covering' what is required for assessment and they may have quite low expectations of their pupils' language learning ability. However, when teachers are confident enough to experiment with new ideas and resources, they are pleasantly surprised at how much their pupils are capable of and how much more professionally rewarding their teaching becomes (Carpenter et al., 2016).

Drawing systematically on a *range* of materials of increasing length and complexity, typically fiction and non-fiction books, historical and documentary works, teachers introduce their pupils to an important focus for the development of linguistic and cultural knowledge. A serious attempt at integrating cultural knowledge into the foreign language curriculum requires not only subject knowledge but pedagogical expertise, imagination and the confidence to break out of what has become the 'tradition' of topic-based learning and textbook teaching. Besides being educationally valuable, such resources are far more interesting and motivating for both pupils and teachers.

The list of possible examples of how cultural content can be restored to the subject discipline is endless and readily available on the internet. Pedagogical issues can be resolved if there is a genuine belief in the capacity of all young people to be inspired by 'the best that has been thought and said', to quote Matthew Arnold (2009). By introducing young people to the culture of a foreign country through

the greatest and most creative works that a society or an individual has achieved, we can encourage them to see that there is more to the foreign language than the functional and sometimes banal representations they normally experience. To restore the cultural content alongside the linguistic content of foreign languages is to restore the status and value of the subject discipline within the school curriculum. In this way, learners of foreign languages move beyond their parochial, subjective experiences, towards appreciating cultural achievements that have spread beyond national boundaries and are part of universal human culture, thus expanding their concept of humanity. This is by no means a return to the past but expresses the liberating potential of foreign languages and the true meaning of the subject discipline both now and in the future.

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Suggested further reading

For a greater in-depth discussion of all the issues discussed in this chapter, see: Pachler, N., Evans, M. and Lawes, S. (2007) *Modern Foreign Languages: Teaching school subjects 11–19*. London: Routledge.

8
Geography

Alex Standish

The goal of Geography is nothing less than an understanding of the vast interacting system comprising all humanity and its natural environment on the surface of the Earth.

(Ackerman, 1963)

Geography is the study of the earth as a home to humankind.

(Johnston, 1985)

When questioned about the purpose of geography, most candidates for student teaching give one of three answers: geography is 'about everything', 'saving the planet' or 'making a difference'. This means that after learning the subject at school, spending at least three years at university studying geography and deciding to enter the teaching profession, these geographers lack a conception of their discipline. This is indeed a peculiar situation of the times we live in and I do not want to delve into the reasons why – that is not the purpose of this chapter. It is true that the scope and range of geographical study are vast, encompassing an array of traditions and approaches, which are difficult to capture in one neat definition. However, this does not excuse the absence of disciplinary clarity, which is a significant and growing problem (see Hanson, 2004; Marsden, 1997; Matthews and Herbert, 2004). If you want to teach a subject you need to be able to clearly communicate to pupils what your subject is about and how it can help them to understand an aspect of the world. So, this chapter aims to explore the nature of geographical knowledge and enquiry, its origins, methods, epistemology and value, and how we can introduce children to this discipline as a school subject.

The evolution of geography as a discipline

As Edward Ackerman notes, geography is the study of the variation of and interaction between physical and human phenomena across the surface of the world. This 'surface' includes the Earth's crust (lithosphere) and its landscape, flora and fauna, the atmosphere, people and culture, the built environment and political territories. Of course, geographers are not the only scholars to study rocks, soil, flora and fauna, rivers, trade, political territories and culture, and hence we share these objects and their related concepts with other disciplines. What distinguishes the geographer's perspective is that we are interested in the relationships between different phenomena that give rise to spatial patterns and areal differentiation. Richard Hartshorne explains it thus:

> The heterogeneous phenomena which these other sciences study by classes are not merely mixed together in terms of physical juxtaposition in the earth surface, but are causally interrelated in complex areal combinations. Geography must integrate the materials that other subjects study separately. (1939: 460)

Geographers begin with the question *where*? Locations, as a fixed point of spatial reference, are to geographers as dates are to historians. Once we know where something is, we can begin to examine what else is found at that location, what is around it and how it is *related* to surrounding phenomena. We need to understand the *processes* that shape the physical and human phenomena, how they *interact* and, therefore, *why* things are located where they are, as well as how spatial arrangements and places *change* with time. Finally, geographers seek to understand humans in their physical environment, how we change and are changed through interacting with it. For this reason, geography, along with history and religious studies, is often included as a humanities subject, even though it draws on social and natural sciences.

The human quest to comprehend differences between areas of the Earth's surface can be traced back to Ancient Greece and Rome. The term 'geography' derives from two Greek words: *geo* meaning 'Earth' and *graphia* meaning 'describing' or 'depicting'. Nevertheless, spontaneous curiosity about the world and geographical thinking preceded any established geographical tradition. Before Eratosthenes estimated the circumference of the Earth and devised parallels and meridians for the globe, and Ptolemy drew his world map, Plato used the terms *chora* and *topos* in his discussion of the process of becoming (Cresswell, 2013).

Chora refers to the place or setting for becoming and *topos* was the achieved place. Following Plato, Aristotle used *chora* to describe a country and *topos* as a region or place within it. Building on the work of Eratosthenes, the 'science of regions' or chorology was at least conceived of in Roman times. One such study was Strabo's (7 CE) 17-volume *Geographica*,[1] an encyclopaedic description of the known, inhabited world of the time.

The Greek and Roman traditions of mapping, measurement, geographical description and hypothesizing about human interactions with their environment were further developed under the Muslim empires of the Middle Ages, with the help of translation into Arabic. In mathematical geography, the size and shape of the Earth were calculated, as were the solar length of a year and the precession of the equinoxes (Alavi, 1965). Hydrological studies were conducted of the Nile and the canal systems of Mesopotamia, including the search for 'hidden water' in mountains (Alavi, 1965). Al-Mas'udi and al-Idrisi were two prominent geographers who studied environmental effects on life and the qualities of people in different climate zones.

Following the Renaissance there was a veritable tradition of travel writing in Europe and beyond, but it was not until the nineteenth century that the disciplinary foundations were laid and geography positions were established at universities. In particular, we have to thank Immanuel Kant (1722–1804) for providing the philosophical groundwork. Kant lectured in physical geography for 30 years at Königsberg (now Kaliningrad). Finding the subject disorganized and lacking direction he proposed two ways of classifying empirical data: in accordance with their nature and in relation to their position in time and place (Hartshorne, 1958). The former is a *logical classification* and is a precondition for studying the spatial variation of particular geographical 'layers' or phenomena, such as population, economies and the hydrosphere (which became theoretical or systematic geography). The latter is a *physical classification* and provides the basis for the study of the interaction of phenomena in given places and regions, for example a study of Lagos or West Africa (regional geography).

The German geographers Alexander Humboldt (1769–1859) and Karl Ritter (1779–1859) developed a scientific method for geography, taking an empirical approach to their studies of Central America (Humboldt) and Central Asia (Ritter). Through extensive fieldwork and data collection Humboldt and Ritter went beyond description in their quest for identifying patterns and relationships through a comparative method. Humboldt called his scientific approach *physikalische* (not to

be confused with physical geography) through which he sought to establish relations between the flora, fauna, humankind and conditions of landscape and climate. The concept of *Landshaft* (a small regional unit) became popular among German geographers who were seeking to find unity and purpose in the landscape (a similar tradition evolved in France with *pays* identified by Vidal de La Blache in his (1908) *Tableau de la Geographie de la France*). For Ritter this unity was God-given, while Humboldt leaned towards aesthetic interpretation.

Geography has sometimes been referred to as the 'mother of all sciences', given its all-encompassing nature and because other disciplines grew from this tradition, such as geology and anthropology (Livingstone, 1992). Indeed, Humboldt's final work was a book titled *Cosmos* – depicting 'all that we know of phenomena of heaven and earth' (cited in Livingstone, 1992: 136). The holistic and descriptive nature of geography did not help its quest for university recognition. At the end of the nineteenth century science was moving towards specialization and mechanical rather than teleological explanations, especially under the influence of Darwin's work. Alfred Hettner (1859–1941) and later Hartshorne (1899–1992) were influential in geography's transition from a chorographic to a chorological science – understanding the collective existence of phenomena in space (Holt-Jensen, 2009). One seminal moment that aided geography's cause was Halford Mackinder's paper, 'On the scope and methods of geography', delivered to the Royal Geographical Society in 1887. Mackinder made a case for geography as the 'science of distribution' that bridged the human and natural worlds (1887: 174). Geography's new scientific approach was developed in Britain by T.H. Huxley and in the United States by William Morris Davis (1850–1934), both of whom helped to establish the sub-discipline of geomorphology. Huxley's *Physiography* (first published in 1877) was a study of nature encompassing the sciences of botany, geology and zoology. Encouraging local field study and experimentation, it became a popular schoolbook at the time. Davis' theory of landscape evolution through cycles of erosion influenced the direction of the discipline for years to come. Geomorphology, as the study of landscape change, distinguished the geographical study from that of geology.

Following the Second World War geography was heavily criticized for its overly descriptive nature and lack of scientific rigour. The response from within the discipline was a quantitative revolution giving rise to spatial analysis and spatial models, such as Walter Christaller's central place theory (spatial arrangement of settlements) and John Stewart's gravity model (distance decay of interaction between locations)

(Holt-Jensen, 2009). Richard Chorley and Peter Haggett's *Frontiers in Geographical Teaching* (1965) and *Models in Geography* (1967) were seminal texts in the new paradigm. Haggett's model for the study of spatial systems was based on six geometrical elements: movements, channels, nodes, hierarchies, surfaces and diffusion.

Yet, by the 1970s such models were in turn criticized for minimizing the human dimension and failing to capture social behaviour. The new radical and Marxist geographers shifted their attentions to inequality, social justice, 'Third World' development, racial discrimination and environmental mismanagement. David Harvey is perhaps the most prominent geographer to emerge from this period with publications including *Social Justice and the City* (2009) and *Justice, Nature and the Geography of Difference* (1996). Significantly, this turn has left many geographers pursuing a social justice and often anti-capitalist agenda in which the line between education and political activism is frequently transgressed, and often unapologetically so. As Richard Peet notes, 'During and after the [Vietnam] war, individuals and small groups of people broke off the issue-orientated liberal campaigns (anti-war, environment, appropriate technology, women's liberation, consumers etc.) and moved towards a deeper, more philosophical, radical politics' (1998: 8). The elevation of social and political causes above subject knowledge within geography filtered down into schools as Bill Marsden (1997) observed in his article 'On taking the geography out of geographical education'.

Since the publication of the first edition there have been growing calls within geography and other subjects to 'decolonize' the university and school curriculum (see Radcliffe, 2017). 'Decolonising Geographical Knowledges' was the theme of the 2017 Royal Geographical Society annual conference at which decolonizing the curriculum was presented as an 'imperative' for all geographers to embrace (Jazeel, 2017). Advocates of this initiative, such as Rudolph et al., propose that 'Both the production and use of knowledge (disciplinary and non-disciplinary) have been implicated by these colonial and racial violences' (2018: 3) and hence call for closer scrutiny of the historical circumstances in which knowledge was produced. Indeed, the geography community is all too aware of how the discipline functioned as the 'handmaiden of empire' during the Imperial Age (Legg, 2017). Hence, academics and teachers do need to be mindful of connections between the discipline and political agendas. The adoption of United Nations Sustainable Development Goals into curricula and research agendas is a recent example of where both school and university geography departments have sometimes

uncritically embraced the agenda of an institution that serves the interests of Western powers. And, in schools, non-governmental organizations such as Oxfam and Christian Aid have long promoted their development agendas through curriculum resources for teachers (Standish, 2012).

The debate about decolonizing the curriculum has also drawn attention to the relative sociological monoculture within the geography community or 'lack of diversity'. In 2016, while 22 per cent of UK-domiciled undergraduate students were black and minority ethnic (BME), this number was only 8.6 per cent in geography; of PGCE geography students training to be teachers only 3.6 per cent (15 students) in the United Kingdom were BME (Garcia, 2018). In her study of school students, Garcia (2018) found that there were cultural differences in *attitude* towards geography, in terms of both its 'intellectual rigour' and prospects for employment. For 'curriculum decolonisers' the way forward is to include the 'voice discourses' of minorities and the excluded in the curriculum, such that their 'identities' are represented in geography in order for it to become less of a 'white' discipline (Pulido, 2002). While I concur with the need to make sure that minorities are included in the curriculum narrative about the nation, what decolonizers are proposing is to replace theoretical, context-independent knowledge with a particularistic epistemology that equates knowledge with experience (see Standish, 2019). This amounts to a fragmentation of knowledge into silos according to people's background, experience or even biological traits, rather than seeing knowledge as universal and potentially accessible to all.

The 'imperative' for a decolonized geography does not offer an epistemological account for disciplinary knowledge, nor does it acknowledge the significant contribution towards the subject made by non-Western geographers in the past and present. What it lacks is a basis for evaluating what counts as geographical knowledge, how geographical knowledge can be tested and evaluated and how it can advance, which is why I now turn to epistemology.

Geography's epistemology

Tim Cresswell (2013) suggests that two questions underpin the geographical tradition:

What is the connection between the human and physical worlds?
How can we account for spatial difference?
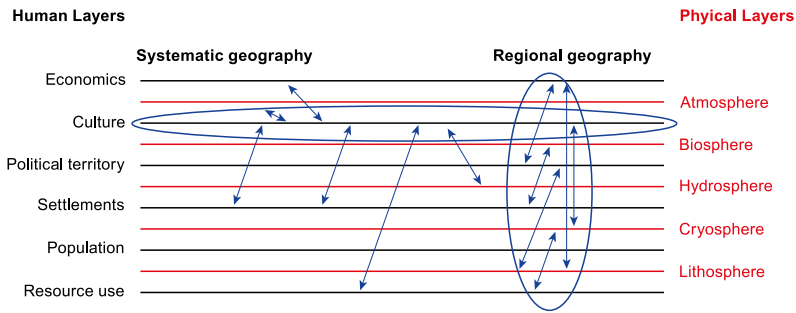
Figure 8.1   Conceptualizing systematic and regional geography (image by the author)

These two questions speak to two distinct but related disciplinary approaches: regional geography (area studies) and systematic geography (spatial theory). Here, we will explore why the geography student needs to draw on both, which needs to be planned for in curricula. Systematic geography focuses on one geographical phenomenon or 'layer' of the Earth's surface at a time (the biosphere in Figure 8.1) and explores how it varies with respect to other geographical layers. Regional geography, or area studies, examines the totality of geographical phenomena or layers, and how they are related, at a given locale or region (see Figure 8.1).

Systematic geography is a nomothetic pursuit in that it aims to develop generalizations: concepts, models, theories and principles about how things are spatially related. Geographers do this by examining one geographical phenomenon (e.g. glaciation or population) at a time – how it varies in space and how it is influenced by other phenomena. Systematic geographical knowledge has evolved as a series of sub-disciplines (geomorphology, climatology, urban geography, political geography) each of which is related to its parent discipline (geology, meteorology, planning/ urban studies, political science – see Figure 8.2). Geographers draw from these individual sciences using the concepts constructed for the study of its specific object (lithosphere, atmosphere, settlements, political institutions). However, the geographer utilizes these concepts for a different purpose: to comprehend spatial relationships and patterns. Because geographers are interested in how objects are associated with other objects, they may modify generic concepts or invent new ones, such as sphere of influence or distance decay. This is important because no concept can capture all the characteristics of an object; each discipline will view an object from its own perspective and devise concepts related to its specific intellectual quest.

THE RELATIONSHIP BETWEEN REGIONAL AND SYSTEMIC GEOGRAPHY

REGIONAL GEOGRAPHY

MARINE SCIENCE / MARINE GEOGRAPHY · GEOLOGY GEOMOR-PHOLOGY · METEOROLOGY CLIMATOLOGY · PLANNING, URBAN STUDIES / URBAN GEOGRAPHY · HISTORICAL GEOGRAPHY / HISTORY · ECONOMIC GEOGRAPHY / ECONOMICS · MEDICAL GEOGRAPHY / HEALTH SCIENCES · CULTURAL GEOGRAPHY / ANTHROPOLOGY AND SOCIOLOGY · POPULATION GEOGRAPHY / DEMOGRAPHY · BEHAVIORAL GEOGRAPHY / PSYCHOLOGY · POLITICAL GEOGRAPHY / POLITICAL SCIENCE · BIO-GEOGRAPHY / BIOLOGY

Figure 8.2 Sub-disciplines of systematic geography and their relationship to regional geography (Nijman et al., 2020)

The value of nomothetic science is that by abstracting from the real world we can begin to see patterns of behaviour and relationship that are not apparent at a more concrete level. With the systematic approach geographers are seeking explanations of the behaviour and patterns of phenomena. While overall geography has a horizontal knowledge structure, within each sub-discipline concepts are arranged hierarchically – aiming for greater precision and certainty with respect to the objects they seek to depict (Bernstein, 1999). In simple terms, when we teach a topic like weather and climate teachers need to plan to work from simple to complex concepts. Some examples of geographical theories and models include the Bradshaw Model, the Demographic Transition Model, the Gravity Model, the Burgess Land Value Model, the Core/Periphery Model, Weber's Industrial Location Theory, the Heartland Theory and Butler's Model of Tourist Resort Development.

When constructing *propositional (theoretical) knowledge* we need to be mindful that the theory continues to explain the behaviour of the phenomena and adapts or replaces it when it does not. An example is the addition of a fifth stage to the demographic transition model when it became apparent that some developed countries had entered a new phase in which birth rates fell below death rates. All sciences experience this tension between the need for universal laws and the facts and circumstances of particular cases. Therefore, disciplines need *contextual (empirical) knowledge* – the facts, data and observations of human and physical features of the Earth's surface. By its very nature contextual knowledge cannot be abstract and therefore does not give rise to generic concepts or theories.

However, it would be a mistake to view regional geography as simply the compilation of facts about a locale. Rather, the significant question for regional geographers is: 'What are the inter-relationships among phenomena that produce this particular set of features?' (Slater, 1982: 3). This task requires *synthesizing knowledge* from geography's sub-disciplines.

Because places and regions are a product of a complex web of inter-actions this method presents a challenge of selecting the geographical criteria and also the starting point, both important for constructing a curriculum. Hartshorne suggests that no geographical phenomena should be discounted if one is aiming to depict something whole. However, not all geographical phenomena are equally significant in shaping the character of a region. The character of regions can be strongly influenced by combinations of geographical characteristics, including mountains (Himalayas), islands (Caribbean), hot deserts (North Africa), abundance of hydrocarbons (Gulf States), rainforest (Amazon) and religious traditions (South Asia).

Both teachers and students of geography must make a determination about which geographical factors and features they see as important for their particular geographical description (Lambert, 2014). The selection of these is subjective but purposeful: exploring the relationships that account for current features, spatial patterns and differences (Clavel, 1998). For example, to account for the contemporary geography of the Middle East it is necessary to understand the significance of Jerusalem to the three Abrahamic religions as well as the modern-day founding of the state of Israel.

Let us consider now in a little more depth how these two branches of geography work together. For generalizations, models and principles to be of value they must necessarily explain aspects of the real world.

This can be done by testing or applying them in different contexts to evaluate how far they can explain natural phenomena, social behaviour, patterns and interactions. In the course of applying generic models and principles the geographer may well discover imperfections and errors, forcing them to go away and refine their ideas and models. The process of hypothesizing, testing, analysis and verification of knowledge is known as *procedural knowledge*, which is the third element of disciplinary knowledge (alongside proposition knowledge and contextual knowledge).

So, while the reliability and value of generic concepts and theories are dependent upon their application in different contexts, 'regional geography in itself is sterile; without the continuous fertilisation of generic concepts and principles from systematic geography it could not advance to higher degrees of accuracy and certainty in interpretation of its findings' (Hartshorne, 1939: 468).

In the end, geography, like history, is an integrative discipline. While knowledge in its sub-disciplines may be organized hierarchically, what matters to the geographer is the ability to understand the connections across areas of systematic knowledge, including how humans interact with their environment, leading to areal differentiation.

Geography as a school subject

Trevor Bennetts proposes that the geography curriculum should aim to develop students' understanding of:

- Physical and human environments and processes,
- Relationships between people and environments,
- The changing character of places and landscapes,
- The significance of location and of spatial patterns, interactions and interrelationships on the Earth's surface,
- The relevance of place, space and environments to human welfare (2005: 157)

This is a comprehensive set of aims for geography teachers to embrace, although we could add knowledge of geographical enquiry, skills and methods (procedural knowledge). It is worth drawing attention to the inclusion of 'human welfare' in Bennetts' aims. As noted above, geography is seen as both a social science and a part of the humanities because we ask important empirical and moral questions about how we live and

interact with our environments. Hence, we can see that human agency and environmental stewardship are integral to the discipline. Although we often separate human and physical geography for pedagogical reasons it is the connections between the different layers of the Earth's surface that is specific to the geographical approach. This is especially true in today's world, where few parts of the planet are untouched by human activity. However, geography is not environmental studies and so to remain within the discipline these questions need to be framed by aims that draw on its disciplinary concepts and epistemology.

Another influential idea is Peter Jackson's (2006) 'Thinking geographically'. Jackson proposed three couplets of disciplinary concepts (space and place; distance and proximity; scale and connection) and relational thinking. By now I am sure you can identify similarities between these different frameworks and the discussion of epistemology above, such as moving between space and place as well as relational thinking. However, Jackson adds the concept of scale and how connections between places will vary as this dimension changes. Having different approaches to disciplinary frameworks gives teachers options and food for thought. What matters for a curriculum is that teachers come together and agree on a set of aims that underpin their vision for pupil development.

The value of identifying disciplinary concepts is that it informs teachers, and pupils, what they are aiming for in geography. How does one know if they are studying economics or economic geography? Economists aim for an understanding of how economies work and function, while geographers study economic activity to understand how it is arranged and connected spatially as well as how it is related to other geographical phenomena (such as resource distribution, climate, population). Without disciplinary concepts to guide us, geographers risk straying into other subjects or non-educational aims, including the promotion of good causes such as fair trade or environmentalism (Marsden, 1997; Standish, 2007, 2009).

Beyond aims, teachers need to induct pupils into geography's methods and modes of enquiry. This means teaching them to ask and to answer questions in both spatial analysis and area/regional studies. Here, we can begin to see curricular implications arising from geography's epistemology. In each key stage of the curriculum it would benefit pupils to be following some units of work that take a systematic/spatial analysis approach and some units that focus on a particular place or region. Or, it is possible to devise units that move between both regional and systematic geography. With both approaches significant questions

should also be raised about how people manage and are influenced by the environment in which they live. Continually returning to regional geography is important from a pedagogical perspective because 'The interplay between topical [systematic] and regional perspectives is what stimulates thought' (Gersmehl, 2008: 23). Here, pupils are learning to see the connections between the theoretical and the empirical or the general and the particular.

The content of what pupils will study is provided both by geography's sub-disciplines (Figure 8.2) and by the different areas of the Earth's surface (including bodies of water). Pupils do not necessarily need to study all of geography's sub-disciplines, but in order to understand the interrelationships between different 'layers' of the Earth's surface that give rise to areal differentiation and spatial patterns, they will need to study most of these. Given that geographers integrate knowledge that is horizontally structured there is not a definitive order in which sub-disciplines should be introduced. Hirst and Peters (1974) likened the curriculum to a jigsaw puzzle. There are many different places one can start, different ways to proceed and places to finish, even though every piece has a correct place. This is especially true for geography and it allows teachers creative licence to plan a curriculum as they see fit. However, we can also say that some layers are more significant than others in terms of shaping a distinctive geography. Rock, landforms and climate all play a dominant role in determining physical characteristics. Population, economies and culture are highly influential human layers.

To a large extent the same is true with regions and places. Pupils should be introduced to all regions of the world over the course of their schooling. This does not necessarily mean that teachers should aim to 'cover' every continent or country. Some regions and places will be taught in more depth than others and an important aspect of the regional approach is to understand the interplay between different *scales* – how places and smaller regions are connected with, and contribute to, larger regions and countries. There is also a compelling rationale for pupils in the early stages of school starting with where one lives (the familiar and concrete) and moving to the more distant and unfamiliar parts of the world. However, this is not an argument for only studying one's own country or continent at primary level as it will need to be explored in more depth and breadth as the pupils' knowledge grows.

Pupils also need to learn the skills and methods used by geographers such that they learn how to ask and to answer geographical questions of their own and over time become less dependent upon the teacher. Skills that are specific to geography include how to construct, use and interpret

maps, as well as Geographical Information Systems (GIS) – geographically referenced data programs used to produce digital maps. In the early years of school, pupils must learn what a plan view is and how the real world can be represented through symbols on plans and maps. Children must learn the meaning of directions and how they can be used for describing location and for orientation. Of course, learning to use maps involves learning many concepts including direction, distance, scale, grid reference, map symbols and contours. Pupils demonstrate skills when they learn to apply these concepts in the construction and interpretation of maps, such as identifying landforms from contour patterns or drawing the watershed (boundary) of a drainage basin.

In the modern world a young geographer also needs to learn how to use a GIS (Fargher, 2017; Parkinson, 2017). A GIS is used to store, analyse, present and interrogate geographical data. This can be as simple as presenting a set of data points on Google Earth to illustrate a route taken or where people live. Or it can be more complex operations such as showing land that would be flooded by a rise in sea level. Many schools are making use of relatively cheap or even free GIS programs such as ArcGIS (ESRI), QGIS and Digi-maps (Ordnance Survey). Many geography students now learn to use a GIS at university or during their teacher training and so are well placed to teach these in schools. And in the age of smart phones and Pokémon Go, many pupils quickly become adept at using GIS technology.

There are many other skills that pupils will learn that are not specific to geography. These include skills of literacy, numeracy and the scientific method. For instance, pupils need to learn how to answer geographical questions through data collection, analysis and interpretation. This means practising methods of fieldwork that are specific to both social science and natural science, such as using questionnaires, measuring the features of a river channel and analysing a soil profile (Clifford et al., 2016). Here, pupils are learning how to conduct research in a simplified form and that this involves applying a methodology systematically to collect data in an unbiased way (Lambert and Reiss, 2014). This *procedural knowledge* also teaches pupils about the process through which knowledge is constructed and verified (Kinder, 2018). Fieldwork teaches pupils that the knowledge they learn in textbooks and the classroom has been created through a process and that the real world is complex and messy.

There is scope for greater collaboration between universities and schools, especially for A-level students, which marks a hinge between the two institutions. One recent example of this was the A-level Content

Advisory Board, which incorporated academic geographers to advise on the content of the new A level. The outcome of this was to introduce more contemporary university geography into schools including place and region studies, global governance, sovereignty and political territory, studies of the oceans and their resources, and food security.

I will briefly introduce two contemporary geographers whose work has potential for the school curriculum. Ruth DeFries' (2014) *The Big Ratchet: How humanity thrives in the face of natural crisis* is a historical and contemporary examination of the struggle to overcome natural resource limits: 'history is a story of continual innovations that have enabled us to surpass existing limits even as they create new problems in their wake.' We have Rosling et al. (2018) to thank for identifying the widespread problem of ignorance about social progress, which is a key theme and question for all humanities subjects to pursue including its contested nature in societies today. Second, in *Twilight of the Elites: Prosperity, the periphery and the future of France*, Christophe Guilluy explores 'The polarisation of employment and the dual process of gentrification and immigration it sets in motion have the effect of reinforcing sociological inequalities within French metropolitan areas' (2019: 60). His research sheds light on the ongoing *gilet jaunes* protests and divisions within French society linked to processes of globalization.

How is geography of value to children?

The first way in which geography is of value is that it *introduces the world* to the child. It shows them what natural and human features can be found in different parts of the world. This might include the beauty of karst limestone landscape along the Lijiang River in China; the destructive power of a hurricane or a tropical storm; the amazing attire of different Kenyan tribes; unusual cultural traits such as the dietary practices of the Jain Indians, who apply non-violence to the cultivation of food; that people can thrive in extreme conditions of cold (Inuit north of the Arctic Circle) and places that receive nearly 12 metres of rain a year (villages in the Indian state of Meghalaya). But geography is about more than the exotic. Pupils should also be introduced to the ways in which our world is being transformed, such as the economic and social transformation of China over recent decades and how Europe has been changed by the European Union, including discussions of who benefits and who loses and why.

It is often claimed that geography is about inspiring a sense of awe and wonder in people. Indeed, generating a sense of curiosity about the world is an excellent starting point for teaching. What comes next is education – pupils must acquire the conceptual and contextual knowledge that enables them to *interpret* and to *make judgements* about the phenomena in front of them, either through direct observation of landscapes and cityscapes or media reports of a hazard or conflict. 'Geography is an attempt to find and impose order on a seemingly chaotic world', suggests Alistair Bonnett (2008: 6). With the acquisition of subject knowledge, young people see the world differently – their perceptions of events and phenomena are interpreted through the concepts and facts they have learnt. Indeed, our very thoughts are structured by the concepts we have acquired. And it is theoretical concepts and ways of thinking that enable a person to *see more*, *further*, *deeper* and to interpret new information with a sense of *perspective*.

Through the study of geography young people will also learn that the pursuit of *knowledge and truth* is a worthy aim, giving rise to the possibility that they will want to pursue these beyond their schooling – whether in geography or another discipline. Even if they choose not to, they will appreciate the value of learning a subject and that knowledge has value for society.

Finally, geography teaches children about *humanity* and will help them to *find their place* within it. Geography shows pupils that being human means different things in different parts of the world, that there are different ways of living, different belief systems, traditions, cultural practices and that people adapt to the challenges of diverse environments. Therefore, geographical knowledge has the potential to liberate young people from the limitations of their personal experience and to show them what is possible. Exposing children to human differences will hopefully enhance their tolerance for different people and different ways of living.

Note

1   Strabo (7 CE), *Geographica*. Online. http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Strabo/home.html (accessed 24 June 2020).

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9

History

Christine Counsell

> *Culture isn't a box to be checked on the questionnaire of humanity; it's a*
> *process you join, in living a life with others.*
>
> (Kwame Anthony Appiah, 2018,
> *The Lies that Bind: Rethinking identity*)

Without knowledge of one's own past, one cannot live as a human. All
our thoughts and acts are tissued with memory. Without knowledge of a
collective past, we cannot think or act socially or politically. This is why
knowledge of history is emancipatory. Only when young people can
generalize appropriately, draw on enough precedent to give explanatory
power to their arguments and share enough common terms of reference
to challenge the grounds of *others'* generalizations and arguments can
they hope to engage with educated discourse and especially serious
political discourse.

Occasionally one hears the argument that pupils could cope without
school history because they can pick up historical knowledge from the
internet. Anyone can access anything the moment they need it, so why
teach it? There are two problems with this. First, we cannot know what
we 'need': history cannot do its educating work at the level of searching
for a fact in response to a question driven by other agendas. Our
substantive knowledge of history works its effects indirectly. It is more
like a medium in which we move that helps us to interpret all that we
hear, see and read around us.

Second, we cannot make sense of the facts of the past unless they
are embedded in stories, and stories, of necessity, are not neutral
collections of facts. Stories are necessarily selective, subjective and
seductive. The shortest of stories is the result of choices, conscious and
unconscious. Stories influence subtly, invest power, make hidden moral

judgement and *always* distort by omission, whether intentionally or not. This is why all educated citizens need not just facts about the past but history as a discipline. For we need to understand why history takes the form that it does in scholarly accounts. Disciplined historical argument is not the same as informal hearing and telling of stories; it requires familiarity with abstract generalizations, an acquaintance with prior scholarly discourse and an ability to deploy evidence, styles of argument and analytic structures in order to substantiate claims. Such disciplinary knowledge is not the same as 'everyday' knowledge and it is not likely to be picked up informally (Young, 2008).

Each of these dimensions – disciplinary and substantive – is vital if history is to achieve its emancipatory potential within mass education. This chapter sets out reasons why the disciplinary dimension matters so much and why the substantive dimension is so vexed. The chapter presents the history curriculum as fundamentally relational in that it can have no meaningful or effective existence outside of history teachers' development and enactment of it. It illustrates this with the collective discourse of England's history teachers, situating it within wider debates.

Disciplinary dimensions: Tradition and renewal

The danger of having a population unschooled by the discipline of history is captured starkly by Shemilt:

> To subscribe to populist and mythic constructions of the past is to remain trapped in the codes and culture of the street gang, to invoke persuasive and partial histories that reinforce simple truths and even simpler hatreds. (2000: 100)

Unlike the stories conveyed by the family, tribe, politician or Hollywood, the discipline of history is a tradition of sophisticated and rational methods for telling stories about our collective past and for handling the socio-historical origins of those stories. It teaches us the conditions under which valid claims about the past can be made and challenged. As Chapman has it, the discipline of history:

> is distinguished from other forms of interpretation of the past by the fact that historians are expected to make their assumptions, concepts and methods explicit, so that they can be critically assessed by an academic community of practice and to present arguments for interpretive decisions that they make. (2011: 101)

Some might say, 'surely in school history, we can just teach the facts and leave disciplinary understanding until later?' But that would be both impossible and dangerous. For while many individual facts are known incontrovertibly, even to juxtapose two facts is to create a story. The interpretive process is brought to bear in the very generalizations we make, in the facts selected or ignored in each story. To leave children ignorant of how that interpretive process works, both the legitimate reasons why respectable accounts will vary and be provisional and the pernicious reasons for deliberately deceptive stories, would be irresponsible. Even if we could somehow find an objective, neutral collection of facts, a convenient canon on which everyone agreed, the idea that we might fool students until they were, say, 16, and do the difficult stuff later, is dangerous. Only a minority of students will study history post-16. The task facing a modern education system in a democracy is to ensure that no one leaves school unaware that any story is a set of choices and carries a message, witting or unwitting.

Although it is difficult to teach the above to all young people, nonetheless, communities of history teachers have engaged in systematic efforts to make disciplinary knowledge explicit for all. The earliest example of this operating at scale and with national and international influence was England's Schools Council History Project (SCHP), founded in 1972. Of course, some pupils had always experienced disciplinary history. Students studying A level history since the 1960s were expected to read widely and to write extended arguments. But this was a tiny proportion of the population. The SCHP sought to bring disciplinary history to all.

With these efforts to teach the structure and rules of the discipline, however, came a gradual realization of the many problems and challenges in doing so. The position we are in today, with sophisticated, professional and scholarly knowledge about the issues, has arisen from a process of continuous problem-solving, mostly by history teachers themselves. The problems surfaced starkly in the wake of the first National Curriculum (NC) assessment model (DES, 1990). Three attainment targets, each built around a disciplinary dimension (then generally called historical skills or thinking), quickly revealed multiple difficulties in the classroom (Counsell, 2011a). This NC attempted to capture gradations of difficulty in disciplinary thinking. So, for example, pupils were expected to move from producing mono-causal arguments, to multi-causal arguments, to arguments in which they classified and prioritized causes. While this sounds logical, as an assessment framework it was a disaster. Pupils were soon chasing surface features and practising formulae that bypassed

both secure substantive knowledge and meaningful disciplinary practice (Haydn, 1994).

Nonetheless, the effort was strangely fertile in providing a framework for experimentation. It was down to the teachers to find out what was possible. History teachers' subsequent collective achievements in gradually refining the distinctive properties of disciplinary knowledge have been prolific.

Broadly speaking, across successive national history curricula and waves of publications by history teachers, the various types of disciplinary knowledge adopted by history teachers in England have fallen into three categories: (a) types of historical question and corresponding accounts; (b) using evidence and (c) interpretations.

(a) Types of historical question

If you pick up a historical journal or browse some scholarly history books, you will find that historians are generally answering one of four types of question. Sometimes known as second-order concepts, the four question types are conventionally (and in each NC since 1991) listed as causation and consequence (Why did apartheid end in South Africa?), change and continuity (How far have the lives of black peoples of America changed?), similarity and difference within a period (What did and did not two communities [or practices, experiences, perspectives, ideologies or people] hold in common?) and historical significance (What kind of historical meaning has the Children's Crusade held over time?).

History teachers' practical explorations, research and debates have done much more than work out *how* to teach pupils how to tackle such questions. They have engaged in curricular theorizing about the property of the discipline itself (Counsell, 2011b). For example, during the 1990s, many teachers shared ways of defining and teaching arguments about historical causation (e.g. Howells, 1998). In the story of such efforts, we sometimes see a particular practical approach catch on, and its durability within an emerging canon of history teacher writing will be linked to its theoretical power (Counsell, 2011b; Fordham, 2015). For example, Chapman's (2003) approach to teaching counterfactual reasoning (using a story about 'Alphonse the camel') has influenced many other teachers, such as Woodcock (2005) who called for new precision in teaching pupils to classify, link and prioritize causes and Buxton (2016) whose pupils found counterfactual possibility by comparing eighteenth-century France and Britain. Woven into this strand of history teachers' curricular theorizing is a growing emphasis on using historical scholarship, either

directly with students or as a reference point for continuously redefining historical causation itself (e.g. Buxton, 2016; Carroll, 2018; Holliss, 2014; Howells, 2005). When Stanford (2019) developed a new kind of model for progression in students' causal reasoning, he was both using and challenging this body of work.

Direct use of historical scholarship has likewise been a feature of history teachers' work on the other second-order concepts such as 'change and continuity' (Counsell, 2017; Fielding, 2015; Foster, 2008). When trying to work out the nature of a historical argument about change/continuity, Foster (2016) went first to two historians' works on American Civil Rights. Duffy's (2008) study of a rebellious Devon village in the sixteenth-century-inspired classroom explorations of new ways to teach pupils to discern patterns of change through narrative (Counsell and Mastin, 2015).

Through such efforts, history teachers manage a continuing dialectic between their reading of historical scholarship and their consideration of how pupils might understand the forms of argument, types of claim and modes of analysis through which scholars make and revise their claims. Such dexterity of curricular thinking has proven essential of late, as UK history teachers have been challenged by the Black Lives Matters movement to respond to gaps or 'silences' in curricular content covered. Contrasting analytic structures or types of argument matter because they reveal or conceal differing narratives. On a popular history website Another History is Possible (AHIP, 2020), one head of history explained his rationale for switching from a causation question 'Why was slavery abolished in 1833?' to a change–continuity question 'Was there more continuity than change in British–Jamaican relations between 1760 and 1870?' The former question fails to problematize the extent to which black experience really changed, whereas the scope and analytic lens of the latter question situates the 1833 abolition in an entirely different story, one that surfaces disturbing continuities and uncovers the stories of black agency that have too often been silenced by 'formulas of erasure' (Trouillot, 2015).

(b) Using evidence

A similar journey of problem-solving in the face of acute difficulties in assessment characterizes history teachers' developmental work on historical evidence. Direct work with primary sources was essential to the realization of the original SCHP goals, but alongside impressive early successes (Shemilt, 1980) significant problems emerged, especially after

'evaluating sources' was universalized by the GCSE criteria in 1985 and assessing skills in isolation resulted in repetitive or distorting exercises. In fact, just about everything that could go wrong did go wrong. Even efforts to make sources accessible to children (McAleavy, 1998) had the unintended result of arid exercises on decontextualized gobbets. In 1990, a senior HMI admitted that some teachers were setting 'mechanical tasks rehearsing formulaic responses to snippets from sources' (Hamer, 1990: 24). But the problems were more serious than making source work tired and routine. Much 'source work' exacerbated a 'serious category mistake' of conflating 'source' and 'evidence' (Ashby, 2011: 139). Many activities encouraged pupils in the mistaken view that a source can be 'reliable' in itself, rather than be reliable for something. Pupils were rarely helped to think about the distinction between inferences from 'records' that bear conscious testimony and from 'relics' that do not (Ashby, 2011).

These mistakes were fertile. What occurred in the late 1990s and early 2000s was a gradual, collective critique and slow reconstruction of classroom source use. History teachers effectively re-contextualized disciplinary knowledge in such a way as to preserve its traditions more faithfully. For example, a determination to allow pupils to synthesize material in authentic ways rather than doing isolated exercises emerged from Byrom (1998), Riley (2000) and McAleavy (1998). A device emerging from this trend was the 'enquiry question' – a culminating question that the pupils would answer at the end of a sequence of lessons (Riley, 2000). One 'enquiry question' would drive all lessons and be invoked regularly by the teacher in order to deepen the mystery, helping pupils to unpack layers in the question. In their study of history departments in the early 2000s, Husbands et al. concluded that this 'enquiry' approach marked a break with the 1980s and 1990s use of isolated, skills-based exercises or 'death by sources A to F' (2003: 110). The 'buzz' of enquiry-led planning began to be contrasted with the trudge through algorithmic, atomized work at GCSE (2003: 132).

A second, related way in which history teachers strove to bring evidential work closer to disciplinary practice lay in the effort to show pupils that one can only establish and weigh evidence *for a particular question*. Lang (1993) noted that pupils were writing off sources for their 'bias' rather than realizing that 'bias' itself has uses. This influenced the ingenious curricular planning of LeCocq (2000). As LeCocq asked pupils to mine sources for unwitting evidence of particular past attitudes, assumptions and beliefs, they came to see how historians make the author's 'bias' itself their object of study. Fourteen years later, Hinks

(2014) developed the work of Lang and LeCocq, using their principles in a new push on 'the bias problem'.

Yet despite all this success in rowing back from reductive, atomized and decontextualized exercises, two decades on, these gains in the teaching of evidential thinking remain fragile. The chief cause of this is wider pressures on public examinations at 16+ and 18+, which continue, very often, to reduce examination questions to formulaic expectations, resulting in teaching to a very poor test. Some teachers nonetheless keep up a two-pronged attack on the problem, and each continues to feed curricular theorizing. First, they outwit the reductive examination demands with a more profound and indirect theory of change for improving pupils' examination performance. Typical of this is McDonnell (2019) who showed how reading long and varied contemporary sources not only provided his students with a richer and more rigorous historical experience but actually prepared them better, in indirect ways, for the examination itself. Second, teachers challenge the examination structure itself. As a solution to formulaic responses from tiny source extracts, Fordham (2016) made the radical case for examining pupils' evidential knowledge and thinking by using agreed anthologies of longer sources.

A key challenge for leaders in the history education field now is to ensure that these frustrations of having to keep disseminating key advances, even to the examination boards, do not become distractions from asking hard questions about the adequacy of history teachers' net improvements to date. Developments in the interpretation of primary source material by scholars of global history need to be carefully considered with a view to improving the repertoire of history teachers in teaching evidential reasoning. One area underdeveloped in history teachers' published discourse is that of teaching pupils about how to establish evidence from primary sources once deemed 'non-standard' (such as legends, myths, poetry, song and dance) in Euro-centric histories but now well-developed, particularly by scholars of African history (Green, 2019; Muriuki, 2002).

(c) Interpretations

A new category of learning defined by England's 1991 NC focused on accounts and representations subsequent to the period under study (DES, 1990). 'Interpretations' of the past had a broad definition. Including academic works and museums, it also embraced popular representations, from novels and films to theme parks and commemorative acts. This curricular category has led to the most explicit exploration by

history teachers of the boundary between disciplinary and 'everyday' knowledge (Young, 2008). In moving beyond the scholarly and into the popular, 'everyday' cultural phenomena were brought alongside disciplinary products, not as a bid for their equivalence but rather to illuminate the social processes and diverse purposes of various interpretations and representations of the past.

In 1991, the National Curriculum Council commissioned exploratory projects to define the disciplinary knowledge that this new rubric entailed. The project team developed taxonomies of interpretation type (academic, entertainment, educational, popular, fictional, personal) and taxonomies of issues that affect the construction of interpretations. These included the interpreter's purposes and influences, the relationship between an interpretation and available evidence and the context in which the interpretation emerged (McAleavy, 1993). Peculiar to this requirement was therefore a direct analysis of how *others* have interpreted the past.

Through their practice, history teachers soon began to shape and refine the knowledge base of this curricular component. Wrenn's (1998) pupils studied how curators gradually altered First World War battlefield sites in response to changing national and popular values. An influential textbook activity by Banham and Dawson (2003) required pupils to examine why interpretations of one historical figure changed over several centuries in response to the interpreters' orientations, the sources they examined or the questions they asked. Norcliffe (2004) used Northern Ireland murals to help pupils analyse the process whereby 'King Billy' was gradually reinvented as a Protestant hero. Mastin and Wallace (2006) had their pupils examining the reasons for changing interpretations of the British Empire, from popular artefacts such as 'empire plates' to cycles of revisionist scholarship. Mohamud and Whitburn (2016) produced guidance for teaching pupils how and why accounts of the building of Great Zimbabwe have changed throughout and since the colonial period.

While this definition of 'interpretation' has remained extremely broad, the role of scholarship within it has matured and expanded. The 2000s saw a new surge of history teachers putting extended scholarly accounts before younger teenagers and using this to advance debate about what this curriculum focus of 'interpretations' ought to achieve. Howells (2005), for example, challenged a growing trend for over-simplifying the conditions affecting an interpretation's construction, suggesting that this encouraged pupils in deterministic views of the historian's art. By the time Hibbert and Patel (2019) were working out ways of teaching a more global Second World War, they were able to do so using the 'interpretations' curricular tradition now thoroughly familiar to a generation of history

teachers. Hibbert and Patel chose to unpack the methodology that historian Yasmin Khan (2015) used in her work to find and reconstruct stories that have little presence in the historical record.

Why has this particular curricular entity stayed both stable as an object of debate and fertile in its problem solving? One explanation is that unlike national curricular traditions in most other jurisdictions, where study of primary sources and study of subsequent accounts sit in the same curricular entity (such as 'perspectives', 'sources' or 'historical consciousness'), England's NC tradition has always separated the two. Of course, in practice, teachers link them productively. Hammond (2007), for example, had her Year 9 pupils explore how contrasting 'theories and methods' shape historians' analysis of sources in the history of slavery. But the two curricular entitlements are kept conceptually distinct. The questions we ask of witness testimony and archaeological records require an entirely different heuristic from those we ask when seeking to explain the construction of a specific, subsequent account (Seixas, 2016).

Uniting these three territories of curriculum development – types of historical question, evidence and interpretation – is the role of historical scholarship. In the last decade, where history teachers' publications and conferences are concerned, scholarship use has burgeoned within history teachers' practice. Over half the workshops at the three largest conferences for history teachers in 2019 involved teachers using scholarship. When Olivey (2019) published his analysis of how he taught Year 9 pupils to understand nineteenth-century workers' constructions of class, his foray into working-class identity was the novelty; his use of scholarship was not. While far from universal, the once isolated calls for using historical scholarship have gone mainstream (Jenner, 2019). This is having the interesting effect of transcending the categories above and may yet yield a currency of new curricular taxonomies (Benger, 2020; Foster, 2011a, 2011b).

Substantive dimensions: The content problem

The aspects and configurations of content that might be taught in any school history curriculum are potentially infinite and highly contested. History's substantive content is horizontally, not vertically, structured; that is to say, progression through it is cumulative, not hierarchical. This means that, in theory, two students might arrive at very high levels of historical understanding and practice, feel part of a common academic

community and be able to communicate via common historical reference points but nonetheless possess widely divergent knowledge, gained through widely divergent routes.

In practice, however, *within* most jurisdictions, both a state's interest in school history and the workings of cultural tradition tend to work against massive divergence of content taught. National narratives are present to some degree in most national curricula, even if the degree of prescription and extent of overt nationalism varies across them. The presence of these national narratives interacts in interesting ways, however, with communities of history teachers, particularly where they have any sense of individual or collective intellectual agency and responsibility. This has resulted in robust debates and often bitter 'history wars' between those viewing school history as an instrument of state-sanctioned narratives and those advocating more varied content, additional perspectives or more attention to disciplinary thinking, whether through greater professional freedom or alternative national curricula (Guyver and Taylor, 2012; Nash et al., 1997; Phillips, 1998).

It is easy for an outsider to view this as a permanent stalemate between beleaguered history teachers and successive, ideologically driven national curricula. The reality on the ground, however, is invariably more complex and interesting, and often productive. In England, the conjunction of a very brief, loose NC (since 1994 no Key Stage 3 history NC has covered more than three pages) and the absence of a common textbook and a strong professional culture of debate has fostered as much curricular exploration around substantive content as it has around disciplinary dimensions.

This culture of curriculum-making, renewal and debate is sustained in a number of settings. The pages of *Teaching History*, and a complementary community of bloggers, see hundreds of history teachers share and debate proposals for teaching new unfamiliar topics or more complex readings of familiar ones, often developed through their own classroom investigations using small-scale research or evaluation. Some of England's history teacher-training courses spend much time discussing intellectual, practical and ethical issues concerning content choice, both with tutors and with placement mentors (e.g. Counsell, 2013). Textbooks at Key Stage 3 tend to be experimental, with authors free to select and configure content.

Commentators vary in their explanations of why this culture exists and why it appears to be self-renewing through its active, teacher-led subject associations. One explanation is the distinctive tradition created by the 1972 SCHP, which not only codified and launched the disciplinary

approaches discussed above but also launched a radically new content offer. This included topics strongly linked to present-day crises. In the 1970s this meant Northern Ireland, the Arab–Israeli conflict, world themes across time such as energy and medicine, and an emphasis on local history through the archaeology of built and natural environment. This did more, however, than just introduce new content. It introduced new fault-lines of curricular debate: overview versus depth; local, national and international history; diverse representations and, because of its emphasis on the concept of evidence, a pressing challenge to find the lived experience of the voiceless.

Another explanation for the dynamic self-renewal of this culture is the increasingly strong tradition of using historical scholarship discussed above. The SCHP itself was partly reacting to shifts in the academy, which even in the 1970s was yielding black history, women's history and attention to indigenous peoples that sought to transcend and critique colonial lenses. The much more recent acceleration of historical scholarship use has intensified calls for radically new content. During 2019, for example, history teachers on social media discussed their use of works that shift the centre of gravity to places other than Europe, such as Peter Frankopan's (2015) *Silk Roads*, or deliberately sought scholarly voices from Africa and Asia when investigating medieval African or Asian history.

A further possible explanation for this curriculum-making culture is England's NC itself. Regardless of the political administration, the terms 'interpretations', 'evidence' and 'argument' have stayed in every history NC since its inception. By enshrining in establishment orthodoxy the critical principles of disciplinary history, each of which requires teachers to teach pupils that history is an active, critical, ever-changing discipline, an interesting irony is maintained, which is that the NC enshrines and preserves its own critique.

Whatever the explanation, England's history teachers remain active in questioning their own safe and familiar content harbours. In so doing, they interact with several trends, some emanating in England, some elsewhere, some recurring across the globe. Such trends amount to calls for more diverse, differently voiced content or differently configured content so as to disrupt the temporal, spatial or cultural myopia that might come from viewing the past through mono-narrative lenses. I shall consider just four examples here: (a) world history; (b) frameworks; (c) representative history and (d) decolonization. I will touch on wider debates and illustrate each with reference to the curricular activity of England's history teachers.

(a) World history and big history

In order to understand debates about world history, it is helpful to consider the United States, where American and world history are traditionally taught as separate subjects. In world history, Dunn (2008) describes two 'Arenas'. In Arena A are those scholars and teachers for whom the primary field is the human species in the planet as a whole. This means connections and interactions among human societies, comparisons of historical phenomena across the world and patterns of very long-term change that cut across countries and civilizations (Manning, 2003). A subgroup in Arena A has formed around a new field known as 'big history'. This examines even larger scales of change from the start of the universe.

Meanwhile, over in Arena B, a separate discourse takes place, and is much less civil. A state of chronic confrontation has arisen between two blocs in Arena B: those arguing that the curriculum should transmit Western political, intellectual and cultural ideals through a consensual narrative of national achievement and those advocating topics that foster multiculturalism and moral sensitivity, namely contemporary international issues, past diversity and a range of civilizations rather than those deemed foundational for European culture.

The Western heritage and multiculturalist blocs in Arena B largely ignore the discussions of Arena A, concentrating their energies on mutual accusation, notably of corrosive moral relativism and hegemonic cultural imperialism, respectively. But, Dunn argues, each understands the other quite well, for they actually hold common assumptions. While the Western heritage bloc treats Western civilization as 'a thing that exists in nature and that possesses historical agency', the multiculturalist position is just as essentialist in its assumption that any culture has its own internal coherence, integrity and logic. For Dunn (and Arena A), any history built chiefly around the achievements and attributes of named cultures is 'fundamentally ahistorical' (2008: 259). Scholars and teachers in Arena A have therefore built curricula and teaching approaches that offer a unified history of mankind with an overarching conceptual structure organized into nine 'big eras' and a rationale that trains teachers to see world history as a distinct mode of enquiry for examining the global past from the Palaeolithic era to today.

Such an approach might be said to tackle problems of partiality and the challenge of selection in two ways: first it omits no major periods or regions; second, it seeks larger patterns of historical meaning that transcend debates about cultures competing for significance.

Set against Dunn's Arena A, debates about teaching world history in England are relatively immature. The practice of teaching 'non-European' cultures and civilizations at primary and secondary level was first mandated by England's first history NC in 1991. For primary schools, world history demands were revived in 2014 and their global character strengthened with, for the first time, an additional emphasis on teaching ancient civilizations in 'overview' rather than just particular regions or cultures such as Egypt or the Maya. Yet this is embedding only slowly, and in general, world history in primary and secondary schools in England largely means a couple of 'other' civilizations or cultures, not the making of historical meaning across space and scale.

It is true that Key Stage 3 textbooks and practical examples include varied world topics that have figured in national curricula since 1991, such as Native American peoples, Islamic civilizations and African medieval empires (see, e.g., Kinloch, 2003; Walsh, 2003). It is true that history teachers' commitment to transforming cultural breadth constantly reinvents itself, as shown in the remarkable popularity of 'Meanwhile, Elsewhere…', a crowd-sourced, online resource developed by Bailey-Watson and Kennett (2019). Moreover, unlike many of their American counterparts, history teachers in England need not labour against the constant constraint of coercive state curricula requiring fixed nationalist narratives. Nonetheless, debate is much more about how to make curricula more responsive to the diversity within Britain and to the breadth of culture beyond it and scarcely at all about radical rethinking of global historical dynamics.

This is all Arena B, not Arena A. Teachers' discussion of Peter Frankopan's *Silk Roads* might suggest a shift, but its influence tends to stay at the level of 'Let's include the Mongol empire' or 'Let's tackle the Crusades from an Arab perspective'. This may well be redemptive of former imbalances, but it bypasses the global panoptic that Frankopan provides and risks an eternal pattern of curriculum planning by topic displacement, failing to solve the bigger question of how pupils are to gain a frame of reference related to the broader workings of the arc of time.

(b) Frameworks

There is one important exception to the above, however. A small but significant cousin of Arena A world history, and scion of England's disciplinary tradition of second-order concepts, is to be found in a distinctive use of the term 'framework'. Frameworks used in this technical sense

are distinct from summaries, overviews and pictures. The latter are curricular *objects* to be learned, whereas frameworks, in this tradition, are pedagogic *instruments* of learning. Howson and Shemilt describe frameworks as 'provisional factual scaffolds … adaptive to student constructions of the past' (2011: 73). Frameworks typically appear as grids indicating big generalizations against temporal scales (big eras over time), human scales (such as patterns of human organization) and spatial scales (from hunting parties, tribes or hamlets to states and empires) (Howson and Shemilt, 2011).

Advocates of frameworks present them as ways of escaping the parochialism of detail or the implicitly culture-bound perspective of a 'grand narrative' (Howson, 2007). The idea is that these very low-resolution instruments can be challenged and modified by students themselves, as and when medium- and high-resolution topics are subsequently tackled. This flexibility is linked to the idea of 'usability'. Here Lee (2004) created a distinction between accounts of the past being 'useful', which may imply plundering the past for *any* presentist moral or civic ends (which would include protagonists on all sides in Dunn's Arena B), and 'usable'. Starter or emergent frameworks can be progressively transformed by students 'until they possess pictures of the past as big and sophisticated as time permits and pedagogical ingenuity contrives'. Lee's criteria for success in the resulting 'big pictures' is that they should be 'open, flexible and self-updating without losing coherence or exhibiting multiple personality disorder' (Howson and Shemilt, 2011: 78).

This approach has gained traction in a committed band of teachers who have designed and taught curricula using such frameworks at topic level (Rogers, 2008), century and continent level (Nuttall, 2013) and the whole of human history (Rogers, 2016). Beyond these, however, it largely remains a theoretical and speculative project.

(c) Representative history

An entirely different response to the content problem has been described by Holliss (2019) as a quest for 'representative' histories. As an effort to complicate traditional depictions and narratives, Olivey's (2019) teaching about how working-class Chartists constructed their own class identity is typical of this, as is history teachers' increasing use of the scholarship of Kaufmann (2017) on black Tudors. Representative history also continues to be spurred on by evidence that certain groups of pupils, notably those from ethnic minorities, fail to see themselves in the past

and are put off school history as a result (Royal Historical Society, 2018).
In England, this effort has gained its own momentum among history
teachers, sometimes augmented by their own or others' research into
students' attitudes to history lessons. In Traille's (2007) study, 124 students
of Afro-Caribbean descent spoke of how history lessons 'imposed identities
on black people that they rejected'. Wilkinson (2014a) drew on interviews
with 295 Muslim boys to argue for better use of history to engage Muslim
youth in civic and political life.

When efforts to render the curriculum representative are
understood in the context of a coherent yet dynamic narrative of history
teachers' writing, it is possible to track the evolution of common goals.
What characterizes teachers' conclusions as we move from article to
article is a shared determination to avoid tokenism. Whitburn and
Yemoh (2012), for example, drawing on their own research into their
students' experience, challenge the teaching of black history as a separate
entity and instead, in the context of studying struggles for Civil Rights
in Britain, integrate stories of black agency and experience. Dennis
(2016) likewise challenges 'Black History Month' and the teaching of
black history as separate units. Instead, through intriguing stories of
Afro-Germans and Afro-Americans within conventional GCSE topics
such as the First and Second World Wars, he aims to show the complexity
of history and that Europe's and America's pasts require the construction
of global histories. Boyd (2019) gathers up all earlier efforts to tackle
women's history and shows them as a continuum ranging from the
limited approaches she critiques ('great women' or distinct women's
history units) through to what she presents as the ideal – a relational and
integrated history in which the agency and lived experience of women
are continuously foregrounded.

Across such curricular innovations, the various rationales
sometimes exhibit a latent tension. Some teachers' rationales relate to
particular students' needs to be visible in the past that they study, such as
that developed by Mohamud and Whitburn (2014) who broadened their
history curriculum to include the histories of Somali communities in
their London school. Wilkinson (2014b) refers to the 'affective' and
'spiritual' success that relates to what pupils learn about themselves and
the communities to which they relate or belong. Others argue for a
diverse history curriculum but purely in terms of the past being diverse,
and *all* pupils need to learn about *all* of that diversity, especially those
pupils who need to gain knowledge of communities substantially distant
from, rather than similar to, their own. Arguing for much more diverse

history curricula, one history teacher remarked, 'history lives in the sources, not in our DNA' (Neumark, 2020).

(d) Decolonizing the history curriculum

Each of the above approaches disrupts long assumed boundaries around stories that once had pedigree in British or European school histories. It could be said that each seeks to do so preemptively, to alter pupils' dispositions when encountering traces of the past, to ask questions of it and to shape and renew narratives and explanations. Moves to decolonize the history curriculum exhibit similar features but, additionally, a more explicit and overt redress against continuing echoes of history conceived as a mainly white, Anglo-centric or Euro-centric and colonial past (Harris and Reynolds, 2018). Explicit efforts to decolonize the curriculum go beyond telling narratives from different perspectives or shaping new ones, into encouraging pupils in critical reappraisal. Moncrieffe (2018), for example, connects 'violent cross-cultural encounters' in Britain's distant past, such as Anglo-Saxons and Vikings, with much more recent migrant experiences. Teacher guidance provided by Mohamud and Whitburn (2016) shows how various approaches to decolonizing the history curriculum can be presented as 'doing justice' to the past.

Teachers who have taken decolonization seriously comment often on the way it alters the character of narrative itself. Here a history teacher, Webb, teases out the implications of historiographical shifts in narratives of anti-colonialism and struggle:

> Traditional histories focusing on 'sporadic events' such as that at … [Amritsar, 1919] give the impression that resistance was exceptional, when in fact it was endemic and took varied forms, from strikes by telegraph workers to women choosing prostitution over conscripted labour. (2020: 43)

Decolonizing the curriculum thus does more than reveal what imperial narratives conceal; it challenges episodic, events-driven accounts that make it hard for the lived experience of diverse peoples to surface (Harris and Reynolds, 2018). This is similar to Boyd's (2019) insight that in surfacing the lived experience of women, we render it impossible to leave accounts in traditional political shapes. Decolonizing the history curriculum thus fits well with the 'meta' quality of England's curricular tradition of 'interpretations' and can be a powerful development of it, as shown in the work of Hibbert and Patel (2019) discussed above.

Conclusion

In all the above curriculum approaches, we see the generative fertility of communities of teachers at work. Teachers need a relationship to the knowledge that they teach. Curriculum cannot be separated from its curriculum-makers.

While it is before the examination years that teachers have most freedom, the collective agency of history teachers is perhaps at its most illuminating in the period when they are more constrained by examination specifications. To innovate and challenge curricular boundaries during an examination course is not easy but, remarkably, many manage it. The work of Dennis (2016), Mohamud and Whitburn (2014) and McDonnell (2019), described above, was all carried out in GCSE classes. Foster and Goudie (2016), challenging the hollowness of GCSE questions, show how they use scholarship to make up for the lack of rigour in GCSE demands, thus avoiding the common problem of pupils going backwards when they begin GCSE. Instead, like Hammond (2014), they choose to serve examination success through wider contextual knowledge that underpins secure and flexible vocabulary comprehension and deployment.

The challenge for history teachers is to ensure that both substantive and disciplinary knowledge work to serve one another and to sustain responsible conversations about the content choices available to them. To teach the substantive alone is to deceive the pupil by suggesting that the knowledge of the past arrives in fixed stories, that it is never possible to reconfigure, rearrange, challenge or defend those stories. To focus on disciplinary knowledge alone, without building up layers of broad, substantive knowledge, denies access to those very debates.

But if the challenge of choosing content will never go away, this is, perhaps, a good thing, for the moment history teachers stop thinking hard about what content to teach is the moment they lose connection with the very intellectual and moral impulse that drives the discipline.

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10

Religious education

Rania Hafez

The net of religion extends over questions of moral meaning and value.
(Gould, 1997)

Introduction

Religious education (RE) as a school subject may be considered to fall
short of conventional measures of knowledge because knowledge is
associated with 'ideas of certainty, reliability, and objectivity, and even
truth' (Young, 2009: 5). Certainly, religion is constituted of historic facts
and textual artefacts, but it is also a lived reality shaped by subjective
experiences and based on belief uncorroborated by empirical evidence.
For many it is far removed from an objective truth that could be taught
and the educational purpose of teaching it is also subject to disagree-
ment. Hence the question that poses itself is: what should be the aims
and content of an RE curriculum for it to deserve a place in a knowl-
edge-led school?

Religion can claim to be a disciplinary subject in that it delineates
boundaries of knowledge and meaning and provides us with an
opportunity to define and engage with an important aspect of being
human. Religion is one of the compasses we humans have used to chart
our moral progress; faith, as much as cognition, has played its part in
moral and cultural flourishing – contrary to overly rationalistic accounts
of human development. It is subjugation (I am subject to) but it is also an
opportunity for emancipation from arbitrariness, in that it provides a
framework, a tradition to frame thoughts, emotions and actions. It gives
us a context of action. It is not sovereignty in a Nietzschean view. Nihilism
is the spectre that arises when sovereignty is defined as 'I invent myself'.

Religion locates the accident of our happening to be within the history of humanity. What you get from great works of art and great religions is that echo across the centuries of what humanity means, in an organic, mysterious, and ecstatic way. Religious thought embodied in texts, interpretations and practices is the site of the disciplinary knowledge that will build the school subject of RE.

This chapter will argue that RE is a distinct school subject with a strong hermeneutical basis that in modern secular societies must be de-coupled from historic and statutory links to collective worship and moral education. Although the RE curriculum we propose will address the history and evolution of moral thought and ideas, it should not indoctrinate students in what constitutes morality but should educate them by providing them with the context and analytical tools, through the study and interpretation of religious texts and practice. Religious knowledge presents us with an historic and philosophical truth that encapsulates the human condition, and RE offers our students a unique opportunity to encounter that 'truth' in a distinctive way, reminiscent of Heidegger's concept of 'Dasein', an ongoing encounter with the world, which embraces one's questioning of it, questioning of others and questioning of one's own being (Heidegger, 2010).

The trouble with RE

The starting point for any discussion of the RE curriculum, namely its current purpose and content, is somewhat hampered by the lack of a specific National Curriculum for the subject. Up to the present day there has not been a centrally prescribed RE syllabus. Although it is the statutory duty of schools to provide RE, the government does not mandate a specified curriculum. The framework document for the National Curriculum in England states:

> 2.1 Every state-funded school must offer a curriculum which is balanced and broadly based, and which:
>
> - promotes the spiritual, moral, cultural, mental and physical development of pupils; and
> - prepares pupils at the school for the opportunities, responsibilities and experiences of later life...
>
> 2.3 All state schools are also required to make provision for a daily act of collective worship and must teach religious education

to pupils at every key stage, and sex and relationship education to pupils in secondary education.

<div align="right">(DfE, 2013, National Curriculum in England: Framework document: 5)</div>

Therein lie the key concerns with the current approach to RE. Firstly its tethering in statute to sex and relationship education (SRE) as well as the act of worship has contributed to a confusion about its aims. Witness the problems encountered at Parkfield Primary School in Birmingham during 2019, where the introduction of an SRE curriculum that actively promoted the equality of LGBTQ+ relationships was vociferously opposed by some parents who perceived it as contradictory to their religious values and norms. The Values Foundation, a multifaith advocacy group, wrote an open letter to the then education minister Damien Hinds, outlining how faith groups were 'extremely concerned that the internationally recognised rights of parents to educate their children according to their own religious or philosophical beliefs are being compromised by proposed government legislation' (Values Foundation, 2020).

Secondly and more importantly the delegation of curriculum content to local authorities has meant an inconsistent approach not always based on sound pedagogical foundations. The content of the RE syllabus is the responsibility of the local education authority (LEA) and its appointed Standing Advisory Council on Religious Education (SACRE). SACREs are advisory groups set up by LEAs under statute. They are composed of authority officers, teacher union representatives, a Church of England representative and representatives of other Christian denominations as well as those of other faiths deemed prominent in the country. LEAs are also required to set up an occasional body called an agreed syllabus conference (ASC) to review and adopt the RE syllabus (DCSF, 2010). The syllabus must conform to broad government guidance, which stipulates it has to be of an overarching Christian content but also include the teaching of other religions deemed to be currently prevalent in Great Britain (Long, 2016).

It is not in the scope of this chapter to review the multiple syllabi currently in use in secondary schools, but it is abundantly clear that the structure of SACREs is likely to lead to a relativist curriculum by committee. This has been corroborated by academic reviews and inspection reports (Freathy and Parker, 2010; Ofsted, 2004, 2007, 2013).

In its 2013 report 'Religious education: Realising the potential', Ofsted criticized LEAs for the paucity of the RE curriculum content and admonished schools for the weakness in their attendant classroom

pedagogy. The report, although contradictory in some respects, both criticizing the broad reach of teaching RE and at the same time suggesting it lacks links to the wider curriculum, does raise important points around the aims of an RE curriculum, aims that will define its content and pedagogical approaches. Ofsted found that weakness in the curriculum and the confusion about the purpose and aims of RE had a negative impact on the quality of teaching and curriculum planning: 'evidence from the majority of schools visited … shows that the subject's potential is still not being realised fully. Many pupils leave school with scant subject knowledge and understanding' (2013: 4).

It only takes a cursory look at the published syllabi of different SACREs to see evidence of this 'confused' approach. Often, SACREs make the same mistake highlighted earlier of confounding the aims of the RE curriculum with the aims of SRE. In one such curriculum, RE is described solely in terms of promoting individual spiritual and cultural welfare, which is expressed as general therapeutic sense of self-awareness, development and capacity for forgiveness (Royal Borough of Greenwich, n.d.). Further misunderstanding of RE is indicated in Ofsted's 2004 report 'An evaluation of the work of Standing Advisory Councils for Religious Education', when SACREs are praised for contributing to social cohesion. Such statements shed light on a crucial problem with past and current approaches to RE, that it is considered an instrument to fulfil broader social and moral aims, aims that do not necessarily provide a viable and sound epistemological basis for any school subject.

A new approach to RE

We propose that the RE curriculum in English secondary schools should have a theological epistemology, a hermeneutic pedagogy and clear and distinct educational aims. By theological epistemology we mean that the knowledge content of the curriculum will be derived from the norms and sources of theology such as scriptures, religious traditions and relevant epistemic concepts such as wisdom, virtue, testimony, scepticism and disagreement (Abraham and Aquino, 2017). It will include both philosophical and religious aspects of faith:

> The philosophical refer to the system of thought contained in a corpus of classical texts or scriptures and subsequent commentaries; the religious refer to a later institutional development, avowed to be built on the philosophical tradition bearing the same name,

and is characterized by canonizations, elaboration of rites, and administration by organized clergies. (Ho, 1995: 116)

A hermeneutic pedagogy puts the emphasis on understanding through a process of translation, recitation and interpretation (Panjwani and Revell, 2018; Sotirou, 1993). As Gadamer says of hermeneutical approaches:

> It is a question of recognizing an experience of truth that not only needs to be justified philosophically, but which is itself a way of doing philosophy. Hermeneutics is not, therefore, a methodology of the human sciences, but an attempt to understand what the human sciences truly are, beyond their methodological self-consciousness, and what connects them with the totality of our experience of the world. (1989: xxii)

We suggest that the religions to be covered by the RE curriculum are the three Abrahamic ones, Judaism, Christianity and Islam, as well as Hinduism. Given the plural approach adopted by recent statutory guidelines and SACREs, this last statement is controversial. But we believe that judgement on which faiths to include in the secondary curriculum must be based on robust educational aims first and foremost, while allowing some room to reflect the current prevalence of modes of belief in a given locality. After all the second largest religious affiliation after Christian nationally is: 'no religion' (ONS, 2011), which has been used to justify calls for the inclusion of humanism in the RE curriculum; we disagree with this suggestion. Humanism as encapsulated in Enlightenment values underpins much of our education system (Calhoun, 2010). Additionally, it is not a religion in the theological sense. The faiths mentioned above have shaped the history of ideas and continue to influence moral, social and geo-political realities. Detailed justification for their inclusion will be presented later in the chapter.

At this juncture it is worth recalling the recommendation John Beck makes to the teaching of a similarly contentious school subject, citizenship:

> One approach which may recommend itself would be to aspire mainly to educate about citizenship rather than for citizenship. The task would be primarily cognitive: it would not extend to fostering any particular set of attitudes, dispositions or 'virtues' – other than those associated with the aims of liberal education generally. The focus would be, rather, upon extending young

people's knowledge and understanding of political ideas, institutions and issues – and where appropriate, enhancing pupils' awareness of the contested nature of some of the most central concepts within the political realm, not least, of course, the concept of 'citizenship' itself. (1996: 363)

Substitute religious education for citizenship and religious for political, and we have a blueprint for a knowledge-based methodology for RE.

Aims of RE

Religious education in the secondary school should have two main aims. First is to teach the students the history and content of the faiths that have helped shape human thinking and our modern world and continue to exercise a great influence over both political and cultural ideas, both globally, and within the United Kingdom.

Second, RE, along with other subjects such as literature, has the role of inducting students into the ancient and ongoing philosophical debates around the nature of what it is to be human. This includes moral reasoning, sociological organization and the practice of freedom, in the way religious doctrine has both empowered and defined boundaries for human action. This will lay a foundation for building students' intellectual capacity for moral reasoning.

These two main aims, although broad in nature, translate into more pedagogical aims when looked at in relation to specific age groups. For the purpose of focusing the discussion, this chapter will consider RE at Key Stages 3 and 4, the point at which students enter secondary school and encounter a timetable of distinct subjects and start developing a critical understanding of subject-specific knowledge.

The *Big Ideas for Religious Education* manifesto (Wintersgill, 2017) outlines key principles for conceptualizing a new RE curriculum that can be distilled in the following objectives:

- to develop in students an appreciation of religion as a distinct conceptual framework of knowledge as well as a manual for living for 'believers',
- to develop students' knowledge and understanding of the tenets, practices and contemporary manifestations of key faith traditions,
- to develop students' understanding of the way world religions have influenced and been shaped by various elements of the human

experience, including our knowledge in history, philosophy, science, art, and culture,

- to develop students' critical approaches and enquiry skills as they explore and evaluate religious beliefs, doctrines and philosophies.

The content of RE

To achieve the aims listed above, we propose that the RE curriculum focus on the world religions that can lay the strongest claim to having a fundamental and continuing impact on the intellectual and social development, primarily of the United Kingdom and on the world at large. We also want the content of RE to reflect the national make-up of the United Kingdom; after all this is a subject in the *national* curriculum. According to the 2011 census, the religious affiliations of the population of England and Wales are distributed thus: Christianity is the largest religion with 59.3 per cent of the population, followed by Islam with 4.8 per cent of the population. Hinduism comes third, with 1.5 per cent of the population (ONS, 2011). Therefore, we propose that the three Abrahamic faiths and Hinduism should be the main faiths in the curriculum.

Why Judaism?

Judaism is the first instalment in the trilogy of the monotheistic Abrahamic faiths, although some scholars draw comparisons between it and the Zoroastrian creed that was contemporaneous in Persia (Maynard, 1925). Judaism has provided us with one of the earliest religious scriptures that attempted a fundamental theory of human existence and laid down laws to govern human life and relationship with the divine. The Tanakh (Torah/Old Testament) provide the earliest example of the laws governing human behaviour and the foundation for thinking about humanity as a manifestation of a divine will. In Judaism we have the foundations of both nationhood and the agency of individuals (Conner, 2015). The study of Judaism will set the foundational knowledge the students need to understand how religious faith was codified and humans started to look to their responsibility to influence and shape the social order and the future in relation to universal values.

Why Christianity?

The second of the Abrahamic faith, Christianity consolidates and 'updates' Judaic law. At a time when the Jewish nation had become a

collection of fragmented minority groups scattered across the Levant, Christianity emerges as a reaction to both geo-political conditions and religious stagnation. It then goes on to transcend its Judaic origin as a faith for a chosen group and takes its message globally, to become the faith of powerful empires. It is within the Christian faith and the interpretation of its scriptures that lay the roots of Western intellectual development. The tenets of Christianity have shaped approaches to government, the law, commerce and social relationships. Much of what makes up European and Western culture has evolved out of Christian sensibilities. No understanding of what it is to be a European nowadays can be achieved without knowledge of the evolution of Christian thought, since Christianity has been central to the philosophical and intellectual progress, which over a certain period was located mainly in Europe.

Why Islam?

The third of the Abrahamic faiths, and undoubtedly the most 'notorious' of our 'isms', Islam went further than Judaism and Christianity in explicitly outlining modern principles of faith and statehood, combining the law with political, social and geographic reorganization. Unlike its two predecessors, Islam was intentionally, and from the outset, a universal faith that aimed for a temporal 'Kingdom of God'. Its rules cover everything from personal hygiene, to trade and commerce, to the principles and practice of governing. A global faith and empire that reached all the way from China to Europe, Islam's influence over many aspects of our modern world are deep and persistent. Under Islam, scientific and philosophical enquiry bridged the ancient and modern worlds and paved the way to the First Enlightenment in Europe (Andalucía), which was the conduit for the subsequent European Enlightenment. Islam continues to play a significant role in current philosophical and moral debates and influence global events.

Why Hinduism?

Hinduism can claim to be one of the earliest religions. Hinduism is an umbrella word for what was known as the eternal order or *Sanātana dharma* (Nicholson, 2010). Unlike the Abrahamic faiths, Hinduism does not rely on divine revelation, nor is it focused around a single prophet or deity. It presents us with a truly pluralist approach to religious thinking and practice, developed over millennia. It is more of a philosophical tradition, one that provides a counter example to revealed religions – one

that has emerged over time through human contemplation and reflection on elements of being in this world. Hindu tenets have had a considerable influence on other faith traditions in the East such as Sikhism and Buddhism, and therefore it is an appropriate foundational religion to study. In current times Hinduism, like Judaism and Islam before it, has evolved into a philosophy of national identity and continues to influence political and social ideas in what is a very populous region of the world (Nicholson, 2010).

It is important that in approaching the teaching of religion, the curriculum does not concentrate exclusively on the observance aspects of a faith, the tenets, rituals and broad beliefs that are known to make up the fundamental framework of a religion. In building a curriculum for RE, Moore (2018) recommends keeping the following key principles in mind:

- Faith is a living philosophy that is both private and public; it cannot be seen in isolation to other aspects of human social organization, such as politics or economics. The secular tradition may decree a separation between state and religion; however, faith has continued to play an important part in the politics around the world, and faith traditions are represented in British political institutions.
- Faith is a lived experience that is both individual and communal. The tenets of a faith are construed and prioritized by individuals and groups differently. It is important that any curriculum recognize in due course the pluralist nature of a religious community and does not present one denomination or stance as definitive. A curriculum may not be able to cover every different interpretation of religious rules, but it has to introduce students to the broad divisions in the context of the conditions that led to their rise. An example would be Orthodox and Reform Judaism, the different Christian churches and the Sunni–Shia divide in Islam.

Building the RE curriculum

'In the beginning was the Word, and the Word was with God, and the Word was God. (1:1) The same was in the beginning with God. (1:2)' (John 1:1–2, King James Bible). This section will argue the importance of engaging with the sacred texts as they are and will discuss the challenges this presents, not least issues of translation and context. It will outline how a spiral curriculum means that students will move on through their

secondary years to deeper study of the complexity of both text and the interpretation method.

The epistemology for the RE curriculum is arrived at by delineating a disciplinary knowledge distinct yet complementary to accompanying disciplines in the knowledge-led school. It draws on Gould's (1997) concept of 'nonoverlapping magisteria' – magisterium, a concept from the Latin denoting a domain of teaching authority. As Gould proposes, 'The net of science covers the empirical universe … The net of religion extends over questions of moral meaning and value. These two magisteria do not overlap, nor do they encompass all inquiry' (1997: 7). Yet teaching about religion is about more than addressing issues of values and morality. Religion occupies a distinct place in the human story that goes further than moral philosophy. Whereas moral philosophy is concerned with intellectual exploration through thinking and questioning, religion guides its followers to answers and enjoins upon them to live by a prescribed morality. The degree to which adherents of a particular faith may use philosophical questioning to arrive at answers will differ in scope depending on the different stages of evolution of a faith. That domain of teaching, the religious magisterium, necessitates an epistemic and pedagogic authority peculiar to it.

A theological epistemology, as explained above, requires that the study of each religion follow primarily the organization of its revelation and own theology, as encompassed in its scriptures and scholarly texts. To avoid the danger of RE becoming simply a history lesson, teaching and learning will adopt an enquiry method, using a philosophical framework that addresses key philosophical themes. These will include (among others):

- The origin, destiny and purpose of the universe and everything in it
- The nature of religion and the divine
- Moral issues and how to resolve them
- Belonging and nationhood
- Law and jurisprudence
- Spirituality

(Wintersgill, 2017: 13–14)

We cannot teach religion without God. The essence of faith is the relationship between the human and the divine. A new RE curriculum can only start from that premise. It is not its place to either prove or disprove the existence of God, but to take it at 'faith value'.

We are not proposing that the study of RE should be theology, but it needs to start in a theological definition of faith. At the heart of most religions is the concept of the divine and/or the supernatural and how we come to know ourselves as humans and our place in time through our connection to the divine. Although it does not necessitate belief in the teachers and students, it will necessitate accepting and adopting it as a premise to the study of faith. Charting the relationship with the deity (or several deities) starts with how the communication between the divine and us is established. Scriptures and the place of gatekeepers to those scriptures are the next instalment in the disciplinary knowledge of RE. This is the interface between the sacred and the worldly. And in building the RE curriculum we will need to explore the matrix of that relationship for every religion (Cush and Francis, 2001). Hence, central to the RE curriculum will be the scriptures and religious texts, forms of practice and the role of scholars, gatekeepers and those who are charged with the interpretation and dissemination of the faith.

The next step is to delineate where the knowledge that builds an RE curriculum could sit in the disciplinary knowledge structure. Certainly, religious knowledge itself could be seen as common-sense knowledge (Bernstein, 2000) in that it is generated as a social reality lived and practised. Religious knowledge, in this context, is gained and transmitted within, and between, groups in what we may deem to be horizontal discourse (discussed in Chapter 1), where across time and place different religions and their followers have created their own knowledge and language structures around different elements of theology. But in terms of knowledge this would reduce religion to a manifestation of individual and communal inclinations forever mutating. And although there will be a space in the curriculum to consider interpretations of faith and practice, lived interpretation by itself cannot form the core of religious knowledge.

To delineate disciplinary knowledge for the RE curriculum, we need to look towards definitions of esoteric knowledge (Beck, 2013). Theology, scripture, and religious scholarship can be considered to form a hierarchical knowledge structure, but within vertical discourse (Bernstein, 1999, 2000; Winch, 2013; Young, 2008). Thus, RE as a disciplinary subject will be built around textual theoretical knowledge that allows students to enter the 'gaze' and expression of a lived faith. There is an ambiguity that characterizes religion and faith, one that is difficult to accommodate fully within the Bernstein model and which the RE curriculum needs to note and make room for.

Next in the epistemology of faith is the understanding of the inner logic of a religion, its signs and iconography, as manifested in its rituals

and practice. Just like looking at a painting or listening to music, we may be able to appreciate it on a superficial level, but it is only when we better understand its language and practice that the total sensibility of it can be communicated. The difference is proximity to the source. Teaching of RE should use religious sources and examples, both textual and temporal (relating to a lived reality of religious practice), to build knowledge and understanding of a faith tradition. In this way something of religion's element of necessity, as a practical guide for living as well as theological understanding, may be accessed, at least in part.

In doing so, we will still be facing the challenge that religion in education has generally been seen from the secular tradition as a translation into secular sensibilities that is perhaps inevitably involved in the translation of ancient texts into English. We need to ask what is being substituted in the translation. This is when cultural habits and myths are substituted for belief. Faith becomes a parable; we take the drama seriously but not what is portrayed.

RE cannot be taught in an objectivist manner, merely as a series of connected facts. Religion is both a textual and a living subject. A faith will have scriptures that encompass its main tenets, but these will also be interpreted by its scholars and experienced, modified and transmitted through generations by its followers. This suggests that a complex, metaphysical approach to thought and abstraction – 'an internal cognitive operation proper to the human soul itself' (McGinnis, 2007: 169) – is required rather than the model of mythos versus logos in Platonic writing.

The pedagogy of RE must consider that one cannot teach religious text as scientifically, or even historically, provable. It will need to rely on interpretations made on the basis of studying primary and secondary texts, within the context of the faith tradition. To start with we cannot fall back on saying religious stories are just fables and that they depict events that never happened since we do not have material evidence that they did. For the people who recorded and transmitted these stories, they did so not because they recognized them as parables but because to them they were historic accounts and measures of morality that defined the relationship between humans and the divine. Without a well-theorized RE curriculum we are in danger of demoting religion to the limited proclamations of primitive societies.

For example, with a weak religious understanding of the Biblical story of Hannah, who gave away her son Samuel to the temple when he was weaned (anytime between the ages of two and four years in Biblical times) to serve God, the story could be considered to be an example of child neglect or even abuse. It poses the question, how would

an RE teacher approach this story in our present day when safeguarding is a paramount social norm? It also raises the historical specificity of the family and familial relationships and connects with sociological aspects of RE.

A new pedagogy of RE presents us with the most important task of the teaching of RE: to let go of relativist approaches to the understanding and teaching of religion. This may sound contradictory especially as the syllabus comprises several religions that present us with different opposing religious 'facts' and values. The teaching of systems of beliefs that are contradictory is not in itself relativist, and our task is not simply to juxtapose one religion against another, but to present each faith tradition within its own logic, language and practices and allow students as they mature intellectually to evaluate religion and faith within their own broader thinking and experience. The problem will arise from superimposing current sensibilities and secular modes of thinking over religion. The challenge lies in letting go of relativist and revisionist approaches when teaching RE and requires us to set aside the prevalent contemporary cynical attitude towards established religion.

Conclusion

The idea of religion itself has come under serious scrutiny in recent decades, leading to strong criticism of the whole concept of RE. Yet it is now more than ever that RE, re-configured, is needed most. As the final report from the Commission on Religious Education (CoRE) (2018) states, if young people are to be intellectually equipped to tackle the major controversies of our times, they will need access to a knowledge-rich school-based RE.

This chapter has made the case for a knowledge-based approach to the aims, content, and organization of the RE curriculum so it may claim its proper place in the subject-led school. We argue that the approach to RE to date has been muddled and has confused pedagogical and intellectual aims with other wider social aims. It is not our intention to dismiss the work of SACREs and LEAs; there is clearly a role for them in building the social cohesion agenda, though we dispute that this is best done through the RE curriculum. We argue rather against the ahistorical and cultural approaches that have characterized continued conceptions of RE. It is heartening that much of what we propose, albeit briefly, in this chapter finds resonance with the national plan for RE proposed by the CoRE in 2018.

The study of religion in the way we have conceptualized it has the potential to inform the intellectual maturing of students as well-informed critical thinkers, able to bring their knowledge of faith traditions to their wider understanding of the world as well as their own moral agency. Faith traditions are a unique repository of knowledge of our sociological, intellectual and spiritual evolutions. RE is a great opportunity to access that rich knowledge and through it enrich the rest of the school curriculum and experience. This chapter is but the start of the conversation.

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11
Biology

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By 'life' we mean a thing that can nourish itself and grow and decay.
(Aristotle, *De Anima*)

Biology, as both of us have many times told students at the start of their secondary schooling, means the study of things that are or have been alive. What life is, though, can be hard to define, even for educated adults – let alone for an 11-year-old on their first day at secondary school. Inagaki and Hatano (2002) showed that young children can distinguish non-living things from animals or plants by appealing to animals' capacity to move and grow and plants' capacity to grow and recover from damage by re-growing. They also draw upon animals' need for food and plants' need for water to differentiate them from non-living things.

A frequent answer early in secondary schooling to the question 'What is life?' is to introduce students to the distinctive, shared properties of all living organisms – a common acronym for these seven characteristics of life is 'MRS GREN': Movement, Respiration, Sensitivity, Growth, Reproduction, Excretion and Nutrition. We are not against such an approach but, in line with the approach of other chapters in this book, we want students in school to be introduced to the sort of knowledge that they are less likely to meet elsewhere, so that they have new tools with which to understand the world, in our case the biological world.

Another answer to the question 'What is life?' is that all living things consist of cells. As Rudolf Virchow (1821–1902) put it *'Omnis cellula e cellula'*. It might be just one cell for organisms like bacteria and fungi or trillions of cells in multicellular organisms like us. Cells make up an organism that is 'said to be alive if it sustains itself through dynamic interaction with its environment' (Phenix, 1964: 106). Furthermore, multi-cellular organisms themselves consist of interdependent co-ordinated

parts, in a hierarchy, as cells aggregate to form tissues, tissues align to form organs, and organs operate within organ systems.

Cells are to biology what atoms are to chemistry – the foundation of study and the building blocks for all life (Mazzarello, 1999). And if cells are the foundation of biology, then what is inside the cells is on the boundary between biology and chemistry, which in itself has its own subject – biochemistry. For biology students, it is important to know that living organisms are made possible by the bonding properties of carbon. One can continue and state that biochemistry is governed by the laws of physics; however, the boundary for what students at school learn in biology needs to be set somewhere. In the other direction from biochemistry, it is important for biology students to study aspects of natural history, namely the lives that organisms live in the wild.

This chapter focuses on the distinct contribution that biology makes. We begin with a brief historical overview of the subject, followed by an examination of the school biology current curriculum and suggestions as to how it might be improved.

A brief history of biology

The word 'biology' derives from the Greek βίος (bios), meaning 'life', and λογία (logia), which, as a suffix, means the 'study of'. In an account of this length, all we can do is identify some highlights in the history of biology. Bearing in mind that what we know of the early history of academic disciplines may tell us as much about the preservation of historical records as anything else, the Greek philosopher Aristotle is often called 'the father of biology'. He started classifying animals in his work *Inquiries on Animals*, in which he also made attempts to describe not only what the animals were like but *why* they looked like they did. Working at a time when biology was little more than legend and the knowledge of those who earned their living from farming and fishing, Aristotle travelled to the Greek Island of Lesbos in the Aegean, teeming with wildlife. Through careful observations and what were probably the first systematic dissections ever undertaken, he laid the groundwork for the discipline (Leroi, 2014).

During the Renaissance, which saw a huge development of knowledge in many areas, the English natural philosopher Robert Hooke first described cells in 1635, by using a new invention – the microscope. He looked at plant cells (Nurse, 2003) and decided on the term 'cell' as he thought that they looked like *cellulae*, the small rooms

(cells) in which monks live and honeybees lay their eggs and store their honey. Such a breakthrough notwithstanding, biology remained closer to natural philosophy at this point in time than to such natural sciences as physics.

Biology as a distinct subject was not really established until later. A possible date is 1736, when the Swedish scientist and botanist Carl Linnaeus' *Bibliotheca Botanica* was published. In this pioneering book, Linnaeus built on the earlier work of others interested in the naming and classification of plants, such as the English naturalist John Ray. Fascinatingly, *Bibliotheca Botanica* is not a classification of plants; it is a classification of books about plants, with a substantial dose of botanical history thrown in. Linnaeus did go on to produce a ground-breaking book, *Systema Naturae*, on the naming and classification of animals and of plants. In that book he formalized binomial nomenclature. What this means is that organisms were assigned to species and every species was given a name consisting of two parts – a genus followed by a specific epithet, both in Latin (e.g. *Homo sapiens*, humans). He then proceeded to produce careful classifications of as many organisms as he could, arranged into an ascending hierarchy of species, all of which ended up being classified into one of three kingdoms – *Regnum Animale*, *Regnum Vegetabile* and *Regnum Lapideum*, which we still know today in the game 'Animal, vegetable or mineral'. Linnaeus was one of the first scientists to recognize the similarities between humans and other primates, which, with hindsight, posited a relationship between the species, an idea that was later developed by Charles Darwin (Reid, 2009).

The importance of Charles Darwin for biology cannot be overstated. His *On the Origin of Species* (1859) is without doubt the most significant biology book ever written. His writings hugely advanced what we know about many aspects of biology, particularly evolution, ecology and behaviour, and his works are still discussed and debated today (Hodge and Radick, 2003). Darwin had a genius for making careful observations from which he formulated hypotheses that he then tried to test, often using inexpensive apparatus that he devised and his children sometimes helped him make. *On the Origin of Species* is still so worth reading, though tough for even a good student until they are in the sixth form. His last book on earthworms (Darwin, 1881) is a wonderful read, suitable for any enthusiastic school student aged 14 or more.

Since Darwin's time, there has been an explosion of biological knowledge. The work of scholars dating back to Aristotle has been built upon, and biology as a subject has seen the addition of numerous topics as a consequence. The field of biology is therefore constantly developing;

each generation of pioneers did not have all the answers needed for their theories, thus leading onto successive intellectual developments, often fuelled by new technologies. For example, Darwin was able to develop a fine account of the mechanism of evolution through natural selection, but he could not explain how inheritance occurred. Mendel in turn was able to describe laws of genetic inheritance in his work on pea plants but did not know anything of the structure of his 'factors' (today's genes). It was not until the 1950s that the combined work of Crick, Franklin, Watson and Wilkins helped elucidate the structure of DNA. Even today, the field of biology is ever expanding, pushing the boundaries of knowledge on, requiring regular updates to the school biology curriculum. To give just one example, Dolly the sheep (whom one of us knew and was responsible for getting her a blue plaque) was born in 1996 as a result of cloning and is now studied in school biology.

The current biology curriculum and possible improvements

There is much in the current National Curriculum for England that biology educators can be pleased about. For a start, biology is well established within science (unlike Earth science), and science, while nowadays not as important in the school curriculum as English and mathematics, remains with them one of the three core subjects, compulsory from years 1 to 11 and nearly always apportioned more curriculum time than other subjects. Then there is the fact that science enjoys less direct ministerial interference than some other subjects. Of course, there are political *contretemps* about the school science curriculum (for instance, the place of climate change and how to assess practical work) but this is nothing compared to rows over phonics, long division and British history. There is also quite a thorough coverage of biology so that students are taught aspects of cell biology, plant biology, animal biology, ecology, genetics and evolution (DfE, 2015).

However, a number of criticisms can be levelled at the present biology curriculum. Perhaps the one that has been made most frequently since the 2014 version of the National Curriculum was published is that it is not obvious for students, indeed for teachers, why certain aspects of biology are in the curriculum and others are not. It looks rather as though the present curriculum is simply the result of a bit of a bun fight in which interested parties fight to get as much of their particular favourites in there. (Indeed, in the view of the one of us who was a

member of the 2011–13 National Curriculum Review Science Working Group, this is a worryingly accurate account of events.) Allied to this is the complaint that the biology lacks a clear route. Topics appear at one key stage and then apparently disappear. Chris Winch has argued 'that gaining some coherent view of "epistemic ascent" from novicehood to expert status within a subject is a key element in curriculum design and that failure to get this sequencing right can have adverse pedagogic consequences' (2013: 134), while Rata (2016) maintains that we need a pedagogy of conceptual progression to enable students to advance in their learning. The present biology curriculum does not help teachers with regard to either sequencing or the conceptual progression of their students.

Now, in some ways these criticisms are a bit unfair and the experienced, capable and enthusiastic teacher can undoubtedly make the present school biology curriculum one that is intellectually rigorous, accessible to almost all students yet capable too of stretching the very best. This is as it should be. However, for new teachers in particular, the present school biology curriculum does not help them a great deal. Indeed, anyone attempting to teach it in the order in which it is presented is likely to find their classes rather confused as to why they are studying what they are studying and having no idea of how what they are learning links with what they have previously learnt.

These shortcomings in the biology curriculum are found in the other sciences too and also in other countries. For this reason, one international movement that has tried to produce more coherence in the school science curriculum is known as 'The Big Ideas in Science' movement (Harlen, 2010, 2015). Harlen and the team she assembled, at her own expense, began from the premise that we find, at least in developed countries across the world, that there is a decline in young people taking up studies in science and other signs of lack of interest in science. Students are widely reported as finding their school science not relevant or interesting to them. Too often they appear to be lacking awareness of links between their science activities and the world around them. They do not see the point of studying things that appear to them as a series of disconnected facts to be learned. In practice, too often the only point that they can discern is that they need to pass examinations. Claude Bernard once wrote that 'The science of life … is a superb and dazzlingly lit hall which may be reached only by passing through a long and ghastly kitchen'; too many students never leave the kitchen(1927: 125).

Harlen and her colleagues went on to argue that a way forward is to see the goals of science education as a progression towards *key ideas*

that together enable understanding of objects, events and phenomena. In all, ten big ideas of science were proposed, of which four are biological:

Organisms are organised on a cellular basis
All organisms are constituted of one or more cells. Multi-cellular organisms have cells that are differentiated according to their function. All the basic functions of life are the result of what happens inside the cells which make up an organism. Growth is the result of multiple cell divisions.

Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms
Food provides materials and energy for organisms to carry out the basic functions of life and to grow. Some plants and bacteria are able to use energy from the Sun to generate complex food molecules. Animals obtain energy by breaking down complex food molecules and are ultimately dependent on green plants for energy. In any ecosystem there is competition among species for the energy and materials they need to live and reproduce.

Genetic information is passed down from one generation of organisms to another
Genetic information in a cell is held in the chemical DNA in the form of a four letter code. Genes determine the development and structure of organisms. In asexual reproduction all the genes in the offspring come from one parent. In sexual reproduction half of the genes come from each parent.

The diversity of organisms, living and extinct, is the result of evolution
All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulted from natural diversity within a species which makes possible the selection of those individuals best suited to survive under certain conditions. Organisms not able to respond sufficiently to changes in their environment become extinct.

The proposals of Harlen and her colleagues have been influential. For example, the entire school science curriculum in Chile is now based around 'big ideas'. In England, the Royal Society of Biology has, at the time of writing, spent some 18 months working on its proposals for the future school biology curriculum. It has taken the 'big ideas' as its starting

point but has not been afraid to depart from the detail. It is also fleshing them out more. For example, there has been extensive debate about what should be in the genetics part of the biology curriculum and we now consider this in more detail to illustrate the ways in which a biology curriculum can take account of both student misunderstandings and recent developments in the subject.

Possible improvements in the genetics curriculum

Genetics is widely agreed to be a core part of any biology curriculum. Yet, it is consistently described as one of the most difficult biology topics to learn (Gericke and Smith, 2014). Reasons for this difficulty include specialized terminology, mathematical content of Mendelian genetics tasks (i.e. calculations of genetics ratios and crossover values), complex descriptions of cytological processes, the order of topics presented in the biology curriculum (which generally separates meiosis from genetics) and the need for students to be able to relate what is going on at a number of scales (nucleotides, chromosomes, protein synthesis, the development of organisms, phenotypic expression, interactions between individuals, population variation). A key issue is how to relate classical Mendelian genetics, which is usually presented as a curious blend of folk history (Mendel in his pre-abbot days, his work ignored by the scientific community) and abstract reasoning (his two laws and all those 3:1, 9:3:3:1 and other ratios), to today's molecular genetics (Gericke and El-Hani, 2018). There have also been calls for genomics to play a much more significant role within school genetics education (e.g. Nowgen, 2012).

There are those who argue that classical Mendelian genetics no longer has a place in the science curriculum – and that students will find genetics easier to understand if we simply start with molecular biology (structure) and go on to the effects that genes have (their functions). Then there are those who, while also not seeing the need for classical Mendelian genetics to be taught, prefer that we start with the results of the actions of genes (e.g. height in humans or diseases such as cystic fibrosis or heart disease) and then use these to work back to understand the structure and functioning of genes.

This latter approach is an example of a context-based approach to science teaching. Those in favour of such approaches maintain that this motivates students, enabling them to see the relevance of what they are doing. Those who are not in favour fear that it detracts from the science.

Although a systematic review (Bennett, Lubben and Hoggarth et al., 2007) concluded that context-based approaches resulted in more positive attitudes to science in both girls and boys and reduced the gender differences in attitude, the number of high-quality studies available to the review was small and none was undertaken after the year 2000. Perhaps more importantly, almost no studies ever randomly allocate students to context-based versus non-context-based teaching. It seems possible that the review's conclusions tell us more about teachers who choose to teach using contexts than about any direct effects on students. Some would argue that we are beginning to stray from curriculum into pedagogy. We are both fiercely of the view that there is an important distinction. Nevertheless, a curriculum can guide teachers as to the pedagogy that they adopt – the various Salters' GCSE and A-level courses (including Salters-Nuffield Advanced Biology) are an obvious example of curricula embedded within a context-based approach.

Irrespective of whether a traditional or a context-based approach is used, curriculum developers and teachers need to be aware of common student misunderstandings. A well-structured curriculum can facilitate understanding whereas one that is poorly structured can perpetuate them. One of us remembers being told years ago of a very senior professor whose third-year undergraduate course on medical genetics got outstanding reviews from students, year after year. When one of her colleagues asked how she did it, she replied – and she taught at a top medical school – that she assumed nothing but began her course at a level more appropriate for students starting biology from scratch. Of course, she went through her early material rapidly but she found that time spent at the start of the course ensuring that her students knew the foundations (the structure and behaviour of chromosomes, the relationship between genes, chromosomes, the nucleus and the cell) paid ample dividends subsequently.

A number of widespread misunderstandings about genetics have been found in school children – and this seems to be true for adults too. Students find it difficult to distinguish between genotypes and phenotypes, between genes and genetic information, and between alleles and genes. They have a tendency to use oversimplified causal explanations so that (a) it is presumed that there is a straightforward, determinist relationship between genes and their effects and (b) it is often thought that each gene is responsible for a different phenotype. These two misunderstandings contribute to the widespread presumption that there is a 'gene for X' where X can be anything from traits like eye colour and diseases such as sickle-cell anaemia and cystic fibrosis through

to much more complicated conditions such as sexual orientation (the 'gay gene'), intelligence, musical ability or pretty much anything else.

Such oversimplifications go hand in hand with misunderstandings about the role of the environment and gene–gene interactions in contributing to the phenotypes of organisms. It should not be thought that these misunderstandings are unimportant. One of us remembers once meeting an adult who had concluded – as a result of paying attention to her school biology lessons on the inheritance of human eye colour – that she could not be the daughter of the person everyone else (including her mother) presumed was her father. With some hesitation, and as best an attempt at being gentle as could be mustered in the circumstances, the fact that eye colour inheritance is actually more complicated than school textbooks generally portray, so that it is indeed possible for a couple with bluish eyes to have a child with brownish eyes, was outlined to her.

In a world where the cost of DNA sequencing is decreasing with extraordinary rapidity, so that the affordability for any of us of sequencing our entire genome is increasing dramatically, combined with ever more companies promising us that our DNA will tell us where we come from, how long we are likely to live and what our personality is, it is important that a genetics curriculum based on rigorous science provides students with the intellectual tools to evaluate such claims.

Practical biology

School biology, indeed all of science, is not just about acquiring good understanding by learning from one's teacher, from textbooks or sources like the internet. It is also about engaging in practical work, both in the laboratory and in the field. Thankfully, the science curriculum and the various awarding bodies responsible for GCSEs, A levels and other qualifications still require a knowledge of biological practices and techniques, though changes to the way that the sciences are assessed at GCSE and A level pose a potential risk to the amount of practical work that students engage in. (For an early indication that the changes introduced by Michael Gove and Nick Gibb may be leading to *improvements* in school practical biology, see Cadwallader, 2018.)

Practical work can serve one or more of five main purposes: to enhance the learning of scientific knowledge; to engage and motivate students; to teach skills that are specific to practical work, whether in the field or the laboratory; to develop scientific attitudes and dispositions;

and to help students develop insights into and expertise of the methods that are used in science (Abrahams and Reiss, 2017; Hodson, 1990). Most students are excited when they start secondary school at the prospect of coming into the science laboratory to do practical work. Lessons with practical work are a good way to learn, to consolidate propositional knowledge and to develop motor and critical skills, but practical lessons for their own sake are not advisable (Brown, 2013). Without some conceptual underpinning, practical classes fall short. Students will know how to do a particular practical – but not why it is of value that they are doing it. If they do not know the reasons behind the practical, students will learn little of lasting value.

Students therefore need to spend time gathering background knowledge and thinking this through before they set out to undertake even a routine school experiment. Many students think that scientists spend all their time in the laboratory doing experiments, yet fail to realize that all scientists undertake long periods of study before embarking on experimental work. To give an analogy from the humanities: you need to study Latin grammar and vocabulary (the theory) before you can read and appreciate the works of Cicero (the practical).

The research evidence consistently shows, however, that the majority of students sadly learn remarkably little when they engage in practical work (e.g. Abrahams and Millar, 2008). Science educators have therefore emphasized that successful practical work requires students to *think* as well as to *do*. This has led to the mantra 'Hands-on, Minds-on' in an attempt to help students to realize that they need to relate what they observe in practical work to underlying scientific ideas.

Fieldwork is of value in all the sciences but has an especial role in biology. However, in the United Kingdom, pressures on curriculum time, rising costs, changes in biology teachers' expertise and heightened concern over student safety are curtailing fieldwork in general, other than when undertaken in school grounds and residential experiences in particular. This is extremely unfortunate as high-quality fieldwork can be truly transformative for students (e.g. Amos and Reiss, 2012). Furthermore, there is an important, if under-appreciated, relationship between laboratory work and fieldwork in school biology. The great advantage of a laboratory is that it provides a stripped-down, simplified version of 'the real world'. In a school laboratory, students can appreciate that woodlice respire and that plants photosynthesize much better under blue than under green light. Such phenomena are exceptionally difficult to observe in the field. However, it is in the field that the biology one has been taught in the classroom or laboratory can come alive in all

its richness and complexity. It is one thing to learn about niche separation in school; it is quite another thing – and for most students much more memorable – to spend an hour mapping the different species of periwinkles on a rocky shore while keeping an eye on the incoming tide and dealing with the enjoyable distractions of oystercatchers, the occasional crab, the weather and the smell of the sea.

Conclusion: Why should anyone study biology?

One can be rather pragmatic in answering the question 'why study biology?' Students may have a notion that they would like to become doctors, for example, and that biology will therefore help them in this. But, instrumental reasons aside, the value of studying anatomy and physiology comes from having a greater understating of how the body works, even if you do not wish to pursue a career in medicine. Studying ecology will increase your awareness of the challenge of sustaining natural systems, and studying cell and molecular biology allows insights into our search for cures for diseases. Thus, students gain knowledge of a specific aspect of our natural world, as well as an idea of how knowledge can ameliorate particular types of problems that confront us.

At heart, to study biology involves studying life in all its intricate forms, which should be inspirational in itself. Most students are fascinated the first time they see *Paramecium* moving under a decent light microscope; knowing the details of how a cell works is a key that can help open the wider world of biology. To become a neurosurgeon, a veterinary scientist, a cancer researcher or a conservation biologist is to join an honourable profession, but they all originate from a wish to study and learn about the living world around us and inside us.

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On the biology curriculum:

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Some useful websites:

Ask a Biologist: https://askabiologist.asu.edu

Association for the Study of Animal Behaviour – Education: https://www.asab.org/education

Biomed Central: https://www.biomedcentral.com

British Ecological Society – Teaching and Learning: https://www.britishecologicalsociety.org/membership-community/special-interest-groups/teaching-and-learning/

National Center for Biotechnology Information: https://www.ncbi.nlm.nih.gov

Royal Society of Biology: https://www.rsb.org.uk

Science and Plants for Schools: https://www.saps.org.uk

12
Chemistry

Gareth Bates

the study of material metamorphosis of materials

(August Kekulé, 1861, as cited in Rooney, 2017: 1)

Where to begin?

Chemical processes are constantly occurring in the universe, be it by cosmological, biological, geological or indeed human means. With the ubiquitous nature of chemical processes, you can be forgiven for thinking it has always been this way. However, up until approximately 300,000 years after the Big Bang no chemistry existed due to the temperature being in excess of 3,000 K, which meant that the energy density of radiation was greater than the energy density of matter. When the universe cooled to around 3,000 K it entered the 'epoch of recombination', where neutral atoms first appeared and, with this, chemical processes could start.

For the purpose of this chapter I will focus on what Lamza calls 'the phase of human chemistry'. He describes this phase as:

> The purposeful activity of humans leads to the progressing penetration of all imaginable avenues of chemistry, from our first experiments with fire to modern analytical chemistry. (Lamza, 2014: 177)

He continues to comment that:

> On the structural side, a bewildering array of atomic, molecular and supramolecular creations has been prepared in human

laboratories whose appreciable stability or even very existence seems unlikely in nature. (2014: 177)

Modern chemistry as a discipline

There have been few, if any, revolutions in science so great, so sudden, and so general, as the prevalence of what is now usually termed the new system of chemistry, or that of the Antiphlogistons, over the doctrine of Stahl, which was at one time thought to have been the greatest discovery that had ever been made in the science. (Priestley, 1796)

As a chemistry teacher you have to consider the historiography of modern chemistry. So, where does the narrative begin? In this chapter I will explore how modern chemistry emerged as a discipline from its alchemic roots. I will then discuss chemistry's place in school curricula and propose ideas of how to structure a chemistry curriculum that builds on the fundamental ideas of atomism, electrostatic attraction and chemical change. Finally, I will explain why chemical enquiry is an integral part of a school chemistry curriculum.

A scientific revolution occurred during the seventeenth century when works by Galileo, Copernicus, Kepler, Bacon, Descartes and Newton paved the way for transformations in 'natural philosophy'. Interestingly, such transformational advances in chemistry occurred much later, during the eighteenth century. This delay has been attributed to the dominance and persistence of 'phlogiston' in chemical theory, developed by German chemist Georg Ernst Stahl in the mid-seventeenth century. During the Early Renaissance of the sixteenth century, Plato's work was rediscovered, and for early chemists, Plato's idea that substances contain a 'burnable principle' influenced the development of the phlogiston theory. This theory stated that substances that burnt did so by releasing a substance when burned and this substance was named phlogiston by Stahl. Robert Siegfried is one among many chemical historians who has researched and written about the chemical revolution. He proposed the following:

Faced with the task of placing the Chemical Revolution in the context of the general history of chemistry, we must reconcile two unarguable truths. The first is the historical reality of the traditional revolution centred on Antoine-Laurent Lavoisier's overthrow of

the phlogiston theory. This view arose in its own time, and subsequent studies have continued to reinforce it.

The second truth is that modern chemistry is founded not on the precepts of Lavoisier's antiphlogistic chemistry, but on John Dalton's atomic theory. (Siegfried, 1988: 34)

The salient point here is that Siegfried makes the case for 'modern' chemistry as the ultimate outcome of the revolution, which saw the transition from the mathematical and hypothetical (physicists') approach of Boyle and Newton to more demonstrable chemists' approach. As espoused by Erduran when discussing the work of Eric Scerri:

chemistry differs from physics generally not in terms of issues of prediction but in terms of classification. Whereas predictions in physics are based on mathematical models, chemical models rely more on the qualitative aspects of matter. Chemistry has traditionally been concerned with qualities such as color, taste and smell. Although both physics and chemistry involve quantitative and dynamic concepts, such concepts are often accompanied by qualitative and classificatory concepts in chemistry, as is also typical in biology. Furthermore, class concepts are used in chemistry as a means of representation. Some examples are 'acid', 'salt', and 'element'. These class concepts help chemists in the investigation and classification of new substances, just as biology is concerned with classification of organisms. Unlike in chemistry and biology, in physics the tendency is towards mathematization, not classification of physical phenomena. Such differences that set apart chemistry from physics as a distinct domain of scientific inquiry have been overlooked within the reductionist framework. (2001: 583)

Another reason why chemistry has endured as a distinctive discipline has been summarized by French chemist Marcellin Berthelot, who stated 'Chemistry creates its object. This creative faculty, akin to that of art, forms an essential distinction between chemistry and the other natural or historical sciences' (1876: 275).

Chemical Abstracts Service (CAS registry), a division of the American Chemical Society, reported during January 2020 that 159 million unique chemical substances have been identified. The majority of these substances do not exist or are not likely to exist in nature given the highly controlled conditions in which they were synthesized, isolated and analysed. After all, modern chemists contrive situations where specific

substances (reactants) are mixed together in a predetermined ratio in a particular medium and at specific temperatures in a confined space.

From alchemy and chymistry to chemistry

> All that glisters is not gold
>
> (Shakespeare, *The Merchant of Venice*)

The modern age of chemistry owes a lot to the work of Lavoisier and Dalton in terms of developing its theoretical and philosophical frameworks. In addition to eradicating the phlogiston theory from chemistry, Lavoisier's other major contribution was to define an element as a substance that cannot be decomposed chemically into a simpler particle. Dalton took this idea further by introducing the idea that the elements are made up of unique atoms that exist as hard spheres.

However, at this point it is prudent to ask why these accomplishments were achieved at all. As previously discussed, modern chemistry is not a reduced framework of theories or mathematical descriptions of matter, nor is it the sole endeavour of chemistry to develop such descriptions. A major enterprise in modern chemistry is to utilize the theoretical frameworks practically to produce useful substances, which requires a space (the laboratory) where the synthesis, isolation and analysis of these substances can take place. This practical aspect of chemistry predates modern chemistry and many familiar chemical techniques in the 'modern' laboratory were being used well before the eighteenth century. William Brock explains:

> Alchemy, and chymistry more generally, bequeathed to modern chemistry a rich variety of chemical operations, manipulations, techniques, and apparatus but not the conceptual frame of modern chemistry. (2016: 24)

It must be noted at this point that caution must be exercised when seeking to dismiss alchemy, especially works that predate the eighteenth century, as the futile and narrow field of transmuting metals. The 'gold making' demarcation gained traction with the 1753 publication of *Encyclopédie, ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers*, which defines alchemy as 'the art of transmuting metals'. In researching the etymology of chemistry, Newman and Principe (1998) suggest that the demarcation of alchemy and chemistry appears to be a historiographical mistake:

Before the end of the seventeenth century, the words 'alchemy' and 'chemistry' (and their cognates in Western languages) were used interchangeably; the restriction of alchemy specifically to gold-making is a late development. (1998: 38)

As a consequence, Newman and Principe (1998) offer a way of clarifying and accessing early work around chemical and alchemical processes:

… since all the topics we today associate under the two terms 'alchemy' and 'chemistry' were indiscriminately classed under either term by early modern writers, we advocate the use of the archaically-spelt chymistry to express inclusively the undifferentiated domains. (1998: 41)

Although the work of these early chymists were based on a practical 'trial and error' approach rather than the use of a theoretical framework to inform their practice, it is clear that chymistry is still evident in modern chemistry. Much of the accomplishments of chymists were achieved by producing relatively pure substances reliably and reproducibly through the application of a number of practical steps, such as accurate mass measurements, volumetric measurements, thermal control of processes, distillation and crystallization.

Another important legacy from chymistry is the notion of nomenclature and symbolic representation. However, chymistry texts regularly used extensive analogy and allegory when referring to chemical reactions and processes. As a consequence, the same substances and process could be described in a multitude of ways by different authors, which makes interpretation of these texts extremely difficult for those who have no guidance. When considered in context it makes sense why early chymists used such poetic and mystical tools. As Brock explains:

We have to recognise that chemistry as late as the 17th century was still not a public science and that in the absence of a patent system, methods of producing medicines, or carrying out chemical procedures that had potential cash value in a world of saleable commodities, were best kept secret or only shared among cognoscenti. (2016: 17)

The need for a systematic nomenclature in chemistry arose in the late eighteenth century due to the productivity of the chemists of that time. Early attempts to name substances were mainly based on physical

properties, such as 'oil' of vitriol and 'cream' of tartar. Arabic words such as alcohol and alkali were commonplace too, and interestingly are either still used by or familiar to today's chemist. However, only a limited number of pure chemical substances were known to early chymists. As the sophistication of chemistry in the late eighteenth and early nineteenth centuries increased, the number of unique chemical substances also increased; coupled with the chemical revolution started by Lavoisier, chemists could begin to name substances based on their composition and constituent elements rather than other arbitrary means. This endeavour would ultimately lead to the conception of the periodic table and the use of the globally recognized way of naming chemical compounds through the International Union of Pure and Applied Chemistry (IUPAC) nomenclature.

The value of chemical education

The preceding sections have stated the case for recognizing chemistry as a distinct discipline, as it has unique philosophical and theoretical characteristics. Additionally, it could be argued that chemistry has made a significant contribution to modern society through endeavours like the production of medicines, plastics, semi-conductors and fertilizers to name just a few. Therefore, if an aim of chemical education is to produce practitioners of chemistry then the value of chemical education becomes self-evident. Clearly not all learners of chemistry will or wish to pursue a career in chemistry so chemical education needs to provide something useful for these learners. From my perspective, the offer of chemistry as a discipline to the learner is a lens through which to view the world that navigates a magnitudinal plane. What I mean by this is that by considering objects at different magnitudes (such as the atomic, microscopic and visible level) learners are able to link ideas of how objects are constructed and why they have their physical properties, in addition to how they relate to other objects in the world.

Chemistry education in schools

One of the main aims of chemistry education should be to offer the learner a route into a career in chemical sciences and this goal helps shape school chemistry curricula. How should this curriculum be organized? Drawing on the work of Basil Bernstein, Karl Maton describes

the organization of knowledge within science, which can be applied to chemistry:

> Scientific culture thereby resembled what Bernstein describes as a hierarchical knowledge structure: 'an explicit, coherent, systematically principled and hierarchical organization of knowledge' which develops through the integration of knowledge at lower levels and across an expanding range of phenomena. (2006: 47)

It is reasonable to assume (and indeed does occur in many cases) that chemistry curricula continually revisit phenomena to introduce more complex explanations, a point not lost on Kuhn:

> As the student proceeds from his freshman course to and through his doctoral dissertation, the problems assigned to him become more complex and less completely precedented. But they continue to be closely modeled on previous achievements. (1970: 47)

Although Kuhn is discussing education from a university perspective it still holds true for what a student experiences during school/pre-university. This 'educational pathway' equips learners with progressively sophisticated explanations to solve increasingly challenging problems, a point that will be explored later.

There are a plethora of definitions for chemistry but in a recent paper outlining its ideal chemistry curriculum, the Royal Society of Chemistry defines chemistry as 'the study of the composition and properties of matter and how and why it undergoes change' (Gibney, 2018: 31). Given this definition, it is reasonable to suggest that any school chemistry curriculum should be designed to explore the nature of matter and the nature of change, both physical and chemical. As a consequence, there are three fundamental ideas that should be integral to any chemistry curriculum:

1. Atomism – matter is made from atoms
2. Electrostatic attraction – the force that holds matter together
3. Chemical change – the formation of a homogenous substance that has different properties compared to the substance/s that made it.

In many chemistry curricula around the world, these concepts are integral and with an understanding of these concepts, other aspects of chemistry can be understood. Additionally, a chemistry curriculum should integrate chemical enquiry because the practical application of

chemistry is integral to the subject. However, there are some intrinsic difficulties with these concepts and as a consequence the pedagogy needs to be well considered in order to support the learning of these chemical ideas and skills.

A major tension that exists in the discipline of chemistry, which is rarely exposed in chemistry education, is the limitations of its epistemology. Returning to the Royal Society of Chemistry definition above, the uncovering of the 'truth' about the nature of matter and chemical change requires an idealized view of chemical substance. Schummer (2010) proposes that chemistry rests on the concept of chemical substances and that chemical substances are idealizations in two regards that each pose limits to chemical knowledge.

The two idealizations that are problematic for Schummer are that the epistemology of chemistry requires perfectly pure substances, which can never be fully achieved in reality, and that these substances (in their pure form) do not exist outside of the laboratory. However, Schummer does concede that:

> The conceptual framework of chemistry is not very suitable to describe the real material world, but still it is the best we have for that purpose. (2010: 175)

Revisiting Kuhn's observation on how educational pathways in sciences, such as chemistry, continually revisit phenomena but present more sophisticated explanations to solve more complex problems, it would be prudent for chemistry teachers to exercise a kind of epistemic humility when presenting chemical knowledge, a point highlighted by the Royal Society of Chemistry:

> We would like to see the use of conceptual and mathematical models more explicitly discussed as approximations that allow us to explain and predict behaviour. In current curricula, treatment of models is often restricted to a succession of atomic models, with the implication that the older (more simple) ones are to be discarded and the most recent one is 'true'. In practice, scientists should aim always to apply the simplest model that will explain a given phenomenon, and may use different models in different situations. Bringing this thinking into the open would give students a more nuanced understanding of chemical thought and hopefully put a stop to teachers being accused of teaching things that were 'wrong' in previous years. (Gibney, 2018: 33)

An example of this is the development of atomic theory where, in general, learners first encounter the notion of atoms as spherical balls (Dalton model). Many curricula then move to state that atoms comprise a small nucleus surrounded by orbiting electrons residing in discrete electronic shells (Bohr model). This model introduces the idea that an atom is mainly empty space and the size of the atom is defined by the last electron shell that is occupied by an electron. This conceptual departure from the idea of solid spheres could draw the criticism from learners of being taught wrongly. It is clear that the chemistry classroom needs to have the potential for open discussions about the approximation of the models in chemistry. It should also provide the potential opportunity for learners to develop and discuss their own models to explain phenomena, as this could offer some authenticity, as Erduran explains:

> Chemists contribute to their science by formulating models to explain patterns in the data that they collect. If effective teaching and learning of chemistry is indeed an intended educational outcome, then classrooms need to manifest what chemists do fundamentally: to model the structure and function of matter. (2001: 590)

For Alex Johnstone, who has been highly influential in chemistry education, 'chemistry is regarded as a difficult subject for students' (2000: 9) mainly due to the nature of the subject itself and the models used by chemists to explain phenomena. Johnstone (1982) proposed that chemists view their subject in three forms: macro, sub-micro and representational. These forms are represented as a triangle (the so-called Johnstone's triangle), where no form is of greater importance and each complements one another. For Johnstone, the levels are described as:

(a) the macro and tangible: what can be seen, touched and smelt;
(b) the sub-micro: atoms, molecules, ions and structures; and
(c) the representational: symbols, formulae, equations, molarity, mathematical manipulation and graphs.

(2000: 11)

The learner comes to the chemistry classroom well equipped to engage with the macro level of chemistry as it is what they encounter on a daily basis, and many of their conceptions will be macro in nature, such as the dissolving of sugar in water. For Johnstone:

Chemistry, to be more fully understood, has to move to the sub-micro situation where the behaviour of substances is interpreted in terms of the unseen and molecular and recorded in some representational language and notation. This is at once the strength of our subject as an intellectual pursuit, and the weakness of our subject when we try to teach it, or more importantly, when beginners (students) try to learn it. (2000: 11)

Certainly much attention and care needs to be taken when discussing chemical phenomena so that it is explicit to the learner which 'level' the explanation is addressing. It is clear from the work of Johnstone that introducing explanations of chemical concepts across all three levels simultaneously could be problematic and confusing to learners of chemistry. Therefore, a more productive approach may be to create a coherent curriculum that gradually addresses the three main ideas (atomism, electrostatic attraction and chemical change) at an introductory phase of chemical education.

Atomism, electrostatic attraction and chemical change

It could be argued that atomism is the most important idea in chemistry, as it underpins all other theoretical frameworks. In the words of Richard P. Feynman:

If, in some cataclysm, all scientific knowledge was to be destroyed, and only one sentence passed on to the next generations of creatures, what statement would contain the most information in the fewest words? I believe it is the atomic hypothesis (or the atomic fact, if you wish to call it that) that all things are made of atoms – little particles that move around in perpetual motion, attracting each other when they are a little distance apart, but repelling upon being squeezed into one another. (1998: 3)

However, it is important to note here that Feynman, although discussing atomism, also alludes to the importance of force (electrostatics), which helps us understand how atoms interact to form larger bodies of matter (compounds and molecules) and how changes of state occur. Despite the apparent importance of atoms, the introduction of the concept of atoms comes quite late in school curricula (at the age of 11 in the English National Curriculum), with early introductory science curricula

favouring a basic 'particle' view of matter. Although particle theory can be used to describe a range of chemical phenomena, when conflated with other ideas, such as state of matter, a number of limitations become evident. For Phillip Johnson:

> At the basic level, particles are linked to the generic states rather than specific substances. Inadvertently, this could encourage the misconception of particles having the observable macroscopic character: wouldn't there be three kinds of particle for three kinds of stuff: 'solid' particles for 'solids', 'liquid' particles for 'liquids' and 'gas' particles for 'gases'? From this perspective, the strength of the forces between particles is seen as a consequence of kind. So the forces for a solid are strong because the stuff is 'a solid', weaker for a liquid because the stuff is 'a liquid' and very weak for a gas because the stuff is 'a gas'. In this sense, the particle theory has not explained anything. (2014: 92)

Johnson argues that a curriculum based on 'the concept of substance' addresses several of the issues highlighted above. Additionally, he argues that the particle model can only explain the mixing of substances and changes of states. In order to explain chemical change, an understanding of atoms and how they bond is required. However, as stated earlier, the idea of atoms (and their constituent subatomic particles) and bonding (electrostatic interactions) is introduced at advanced stages in what Johnson calls the 'customary' chemistry curriculum. It would therefore seem reasonable to introduce a more complex model of an atom at an earlier stage of introductory chemistry curricula in order to introduce the ideas of bonding at an earlier stage. However, there are inherent problems with the teaching of bonding:

> We have suggested that some aspects of traditional ways of teaching the topic may have contributed to the learning difficulties faced by many learners. This was reflected in the literature discussing learners' conceptions of chemical bonding where some key issues (over-reliance on the covalent-ionic bonding dichotomy; adopting the octet rule as the basis of explanations of bonding; and seeing bonds as ontologically quite different from physical forces) seem to reflect common teaching approaches. (Levy Nahum et al., 2010: 201)

The octet rule stated above refers to the idea that atoms gain, lose or share electrons to attain electron configurations nearest to that of a

noble gas (elements located in group 0 of the periodic table and have 'full' valence electronic shells). Looking at consecutive elements on the periodic table, it would mean that lithium up to calcium would obtain eight electrons in their outer shell, hence octet. Although it may seem that we need to rethink our approach to the teaching of chemical bonding in order to alleviate, or indeed eliminate, the tensions discussed, a more pragmatic solution is presented by Joki and Aksela:

> Rather than avoiding the octet rule altogether, it may be better to increase understanding of the different kinds of explanatory models and to be cautious about explaining phenomena in a teleological way. It is preferable for both students and teachers to recognise when a schema is more like a mnemonic or an explanation. (2018: 934)

In support of this, Taber, who has written extensively on the problematic nature of chemical bonding as a topic in chemistry education, offers the following thoughts:

> my recommendations for teaching chemistry would be to try and follow such an approach. In particular teachers should:
>
> - Introduce electrostatics early.
> - Avoid over-emphasis of the octet rule, octets, full shells etc.
> - Present an ontology based on systems of nuclei and electrons.
> (1999: 31)

Chemical change could be seen as the application of atomism and electrostatic attraction as it involves the rearranging of atoms and electrostatic interactions in a reactant or reactants to form a new substance or substances. The main pedagogical issue within chemistry education is that chemical change is usually introduced at early stages of introductory science curricula, and the explanatory models used by teachers are not based on atomism or electrostatic attraction. For Johnson (2014) this leads to a classification approach, where chemical change is classified as irreversible in order to distinguish it from physical change, which is classified as reversible. An easy way to illustrate this would be to put an ice cube tray full of water (liquid) in a freezer overnight. The next day you would have solid water (ice). After removing the ice cubes from the freezer and leaving them in a room that is around 20 degrees Celsius, it will return to its liquid state. This process could be repeated numerous times and would be deemed reversible.

From this classification phase, the curricula move on to discussing chemical reactions on a representational level (Johnstone, 1982), using chemical formulae and balanced equations, with little explicit reference to the macroscopic and sub-microscopic levels. A potential path would be to embed chemical enquiry and practical investigations to support the learning of the theoretical frameworks.

Chemical enquiry

The final area, which has had little attention until now but is a fundamental aspect of chemistry, is the experimental and practical application of the subject. As previously discussed, a key distinction between chemistry and other sciences is the fact that, broadly speaking, chemists synthesize the objects that they study. In order to make these objects, chemists will need knowledge of synthetic skills and processes, in addition to the knowledge of chemical reactions and their mechanisms. In discussing the 'big ideas' in chemistry Gillespie suggests how practical investigation can be used to support the learning of chemical reactions/change:

> Understanding reactions has been a primary aim of chemists from the days of the alchemists. We now recognize many different types of reactions, but two in particular, acid–base and redox, are of fundamental importance throughout inorganic, organic, and bio-chemistry, and I believe they must be dealt with in the introductory course. But they cannot be fully understood simply in terms of their definitions as proton transfer and electron transfer. They should be introduced and discussed in terms of observations on real reactions carried out by the student in the laboratory or, as a second best, as lecture demonstrations live or on video. (1997: 862)

This notion can easily be extended to other phenomena and conceptions discussed in chemical education. Opportunities should be created for learners to interrogate phenomena in order to construct, share and refine their understanding and explanation of phenomena:

> There is a tradition in chemistry education which involves handing down of concepts and principles (e.g., solution, Le Chatelier's principle) to students without engaging them in the processes of chemical inquiry that make possible the generation of these concepts and principles. In particular, rarely are students facilitated

in modelling the structure and function of matter themselves. Furthermore, students' experimentation in the chemistry laboratory is conventionally based on rote recipe following and is not representative of chemical inquiry that underlies what chemists do. (Erduran, 2001: 590)

I would propose that the suggestion here is that critical attention needs to be paid to the value a 'recipe' or provided method has in the context of the intended outcome of the practical enquiry. After all, in much research and industrial chemistry, new substances are usually generated from 'common' and easily accessible precursors that are synthesized from established 'recipes'. Using the synthesis of copper(II) sulfate crystals as an example: if you think the value of this practical is to make high-quality crystals, then following a detailed method to ensure the processes are followed sequentially is required. However, if you think the value is to give a practical example of a metal oxide reacting with an acid to produce water and a salt, then yielding a blue solution after the heating of approximate amounts of copper(II) oxide and sulfuric acid using a brief description of the process would suffice. This type of critique of practical activities is essential when deciding where to use detailed methods.

Considerations for the chemistry classroom

This chapter has explored the epistemological basis for chemistry and has hopefully made the case for its recognition as a discrete discipline, different from other scientific disciplines. As a consequence, chemistry as a subject of study requires specific pedagogical considerations in order to induct learners into the theoretical frameworks and explanatory models of chemical phenomena.

What does this look like in a practical sense for a classroom chemistry teacher?

Chemistry is, by its very nature, a practical subject so almost all chemical ideas can be demonstrated with a practical activity. Therefore, I would advocate that any chemical knowledge that is being taught should be illustrated with a practical. This approach enables the learners to gain a direct link between a 'macroscopic' phenomenon and a 'microscopic' explanation for its occurrence. However, it is less about having a 'list' of specific practicals that need to be performed in certain ways and more about when and where you situate the practical in your sequence of learning.

To illustrate this, let us consider a simple chemical reaction. One choice would be to present the chemical equation and theory at the beginning of the sequence and then observe the chemical reaction to confirm this at the end. This is advantageous when the observable chemical reaction is muted (e.g. dilute sodium hydroxide solution reacting with dilute hydrochloric acid). The initial learning in this instance is provoked with the 'microscopic' and 'symbolic' representation of the reaction.

Or alternatively you present the chemical reaction at the start and construct the chemical equation and theory in the subsequent activities. In this instance the chemical reaction could have more observable phenomena (e.g. effervescence from the reaction of dilute hydrochloric acid with calcium carbonate) that provokes the initial learning through the process of observing, which then leads to theorizing the chemical equation.

The skill of the chemistry teacher is to select the most appropriate approach that enables learners to navigate effectively through different aspects of chemistry as a discipline.

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Teaching resources

Royal Society of Chemistry – Education: https://edu.rsc.org/
This website has a wide range of chemistry resources and CPD for subject and pedagogic knowledge development.

STEM Learning: https://www.stem.org.uk/
This website has a range of resources for teaching and CPD courses to enhance your subject knowledge and pedagogic knowledge.

Teachit Science: https://www.teachitscience.co.uk/
This website has a range of peer reviewed resources that link to National Curriculum topics.

13

Physics

Gareth Sturdy

A scientist in his laboratory is not a mere technician: he is also a child confronting natural phenomena that impress him as though they were fairy tales.

(Marie Curie cited in Curie, 2001, *Madame Curie: A biography*)

Physics versus natural philosophy

Do you know the one about the pastor in church asking the children, 'Can anyone tell me what is small and grey, eats nuts, and has a long bushy tail?' A little boy pipes up, 'Well, I know the answer must be Jesus but …' There is an analogue in the school physics lab: 'the Ancient Greeks' is a reliable default answer to all questions on the origins of science. Everyone knows the Greeks invented physics: machines and forces – Archimedes; atomic theory – Democritus; magnetism – Thales; size of the Earth – Eratosthenes; and so on. When asking where physics began, we know the answer must be with these early pre-Socratic philosophers, who were known by their contemporaries as 'physikoi' or 'those who question the world' and of whom Socrates, concerned with man more than the world, had such a dim view. Or, perhaps with more confidence, we could date the founding of the discipline from Aristotle's *Physics*, written around 350 BCE (Aristotle, 2008).

No first-year physics undergraduate is seriously expected to read and know the pre-Socratics or the five volumes of *Physics*, because none of this work resembles anything of what has ever been studied as physics. Very few working physicists either know or care what is contained in *Physics* because it is plain wrong. Aristotle could not be called a physicist.

Physics is a foundational document of Western culture that represents a crucial turning point in man's understanding of rational enquiry, but the places in which it is studied are within the philosophy and history faculties, not the labs.

If physics has been with us for over 2,000 years, why was Cambridge's first chair in it not created until 1871, and Oxford's as late as 1900? The answer is that the discipline of physics is not as old as the hills of Athens, but is in fact thoroughly modern. Galileo, Kepler and Newton were astronomers, mathematicians and philosophers but not physicists. David Wootton (2015), in his recent reassessment of the history of science, claims that modern science as a whole was invented between 1572, when Tycho Brahe saw a new star, and 1704, when Isaac Newton published his *Opticks*. This is merely a trivial game of semantics, you say, because no matter what they were called, those individuals were *doing* physics. That is to read history backwards, however. Drawing a distinction between physics and natural philosophy is crucial to a proper understanding of how physics arose, what it is and, more particularly, why it is important to children and the school curriculum. Earlier enquiries into natural phenomena were couched within theological or metaphysical frameworks and criteria rather than those of later, secular science.

According to the *Oxford English Dictionary*, the first use of the word 'physics' in English occurs *c.*1487 by John Skelton ('phisikes'). The first modern spelling appears in 1756, in Warton's *Essays on Pope* (OED, 2017). The authors are using the word in the same sense as Aristotle, as a term for the rational exegesis of nature. 'English intellectuals in the second half of the seventeenth century used "physicks" to mean "knowledge of nature or 'natural philosophy'"' (Wootton, 2015: 26–7).

During the late fifteenth and mid-eighteenth centuries, the rise of mercantilism and technological advancement had started to sow the seeds of a new kind of epistemology (Rossi, 1970). This came to full flowering in the work of Newton. His development of *natural* philosophy into a specific and systematic method of *experimental* philosophy created a new set of conditions through which man might come to know the world. It was this new method that was called physics, and it had never existed until Newton. To emphasize the difference between natural philosophy and physics I provide a brief account of the Aristotelian worldview that underpinned the former and was superseded by the development of the latter.

Aristotle and the problem of change

Susan Wise Bauer (2015) explains that, unlike Plato, Aristotle (384–322 BCE) did not regard physical changes in natural objects as signs of decay signifying moral inferiority but rather viewed them as signs of their intrinsic purpose. For Aristotle, a seed turning into a tree is a sign that the world of things is imbued with purpose, which is revealed through its development. Changes in natural phenomena become something to be observed, and by so doing explanations may be sought and revealed. We gain valuable knowledge of the teleology of things in this way.

Each entity, reasons Aristotle, has its purpose contained within it from the beginning. Therefore, the universe follows a principle of motion by which all things must move, to travel towards a more perfect future state and thus unfold their purpose. In this scheme, God is the unmoved mover that instigates all motion. Motion is thus not random (as Democritus' atomic theory had it); it is the action of an object seeking out its 'proper place'. Those things are *natural* that, by continuous movement originating from an internal principle, arrive at a completion. This is Aristotle's meaning of *phusis* – nature in the sense of an object's true nature, its internal purpose, logic or driving rationale.

Aristotle goes on to create a Scale of Nature (*scala naturae*) in which all natural entities are graded and ranked in a continuum. A large part of Aristotle's work describes, organizes and classifies this system, for which purpose he invented his own vocabulary and categories. His written observations and taxonomies proved to be influential among subsequent medieval scholars, but his use of the word 'nature' had a different meaning from the one we would attach to this word today.

From the initial observation of physical mutability and decay in the natural world, Aristotle widened the scope of his questions to a principle of motion, understood less as a purely physical phenomenon, as in its contemporary meaning, but as an expression of a future-directed movement of things towards their perfection. A state of perfection, however, remained determined by a thing's God-given intrinsic purpose. In his teleology, Aristotle was close to Plato, but in his more positive interpretation of mutability in nature, Aristotle moved away from a central tenet of Plato's thought.

For all Aristotle's appetite for observation of the natural world, he was as much a deductive reasoner as senses-spurning Plato. Aristotle does not really observe *phusis* and induce laws from his observations; he always starts with a grand principle and *interprets* what he sees through

its lens. This is one reason why the author of *Physics* can never be called a physicist.

Galileo's redefinition of motion

Galileo (1564–1642) was able to study motion in a more systematic manner than had been possible in Aristotle's time. Through his encounters with the new long-range ballistics being developed in the Italian city-states, and his consequent experiments rolling balls down inclines and off the end of benches, Galileo discovered that projectiles move with a parabolic trajectory, not a triangular one; that is to say, they are subject to a downwards motion *at every instant* of their forward path. There can be no sense of a motive force that gradually runs out. Rather, in Galileo's new principle of motion, any object can be given any motion, which it will then attempt to continue in a straight line forever.

Earthward motion is seen in this scheme as an ever-present resistive corollary, bending and distorting the otherwise perpetual linear flight of the projectile and in the process destroying the idea of 'natural motion' in the sense of objects fulfilling unique purposes. Galileo was able to determine that the rate of falling in this earthward motion was the same for all objects and thus helped free the concept of motion from its Aristotelian, metaphysical trappings.

Newton's *Principia* and its new epistemology

Newton (1643–1727) tackled the problem in his first published book, a dense three-volume discussion of matter, motion and force called *Philosophiæ Naturalis Principia Mathematica*, the Mathematical Principles of Natural Philosophy (Newton, 1999). It was first printed in 1687 (in Latin) and revised twice by Newton himself before 1728, when the first version in English was produced.

In Books I and II, Newton retained Galileo's ideas but extended them, creating three laws of motion that specified a new definition of force in a final and fatal revision of Aristotle. Force was no longer the cause of movement in an object; it was the agency that *changed* an object's motion. It was a subtle correction, but one that enabled a force to be precisely measured and thus brought all force, no matter what the size, within human grasp. At the beginning of Book III Newton set out his

'rules for the study of natural philosophy', which, in effect, constituted a monumental epistemological breakthrough.

The first rule was to favour simple explanations because they are more likely to be true than complicated ones. It is easier to establish whether a theory is false if it is based only on a small number of assumptions. The second rule was that phenomena of the same kind are likely to have the same causes. The third was that if a property can be shown present in all experiments that can be done, then it is assumed to be present in all possible bodies. The last was that a general theory is considered true if it is based on consistent results from conducting a series of experiments.

Newton had to devise a new branch of mathematics (the calculus) to find a way of calculating a change in gravitational force given that its variation with distance was not a linear relationship. This technique of predicting results when conditions were constantly changing (also being worked on independently by Liebnitz at the same time) proved to be absolutely revolutionary. Newton's basic principles involve fairly straightforward physical laws governing a small number of fundamental properties of the universe such as 'mass' and 'extension in space'. These laws are abstractions, simplifications or idealized situations that were originally induced from nature, using minute observation. But, by bringing mathematical logic to empirical observation, Newton was able to predict more complex behaviour in a bid to match the idealizations and simplifications to their empirical referents in the real world. So, the predictions are then tested under further minute observation of the experiment, and where necessary the original laws are revised or falsified. This experimental method of induction and deduction, once established by Newton, was continued by subsequent physicists.

The scientific method, thus explicated, eventually secured a very high status for knowledge produced in this way. The status of scientific knowledge is guaranteed by its powers of generalizability over many empirical examples, and by its predictability, which was largely underpinned by introducing mathematical logic. This was in essence Francis Bacon's inductive method but refined and then extended to the whole universe, rather than restricted to a specific case.

However, in the 'General Scholium' in the *Principia*, Newton added a new limit on Bacon's method. He insisted that one could not go from finding a general theory to a cause, that is a *reason* for the theory. This was the grand philosophizing mistake of the ancients. According to Newton, one could make no comment on *why* a phenomenon happened, only on *how* it happened. Newton postulated the gravitational force but refused to attempt any explanation of how it arose or why.

The significance of Newton's work went far beyond those pertinent to method alone; taken together his works contributed to a new paradigm of thought. To know was now to stand apart from a natural phenomenon and deliberately disturb it: to proceed to divide it into constituent parts according to deductions from unalterable fundamental laws; to then quantify and measure these constituents; and finally to induce from them new relationships strictly coherent with mathematical logic. This was Newton's scientific method, which was a synthesis and augmentation of the earlier attempts at empirical analysis by Bacon, Descartes, Kepler and Galileo.

A new discipline

The profundity of his work notwithstanding, Newton continued to see his work as falling within natural philosophy but undergirded by rigorous and pioneering mathematics. The term 'physics' was introduced by Newton's protégé, David Gregory, who became Savilian Professor of Astronomy at Oxford (Gribbin, 2005). He wrote his own commentary on the *Principia* in English called *The Elements of Astronomy, Physical and Geometrical* (published posthumously in 1715) in which he referred to Newton's work not as natural philosophy but as *physics* and 'the first in dignity of all inquiries into Nature whatever'. This is the first recorded use of the word in English in its modern sense (Gregory, 1715).

Physics was thus now the word for both Newton's new epistemological system *and* the concepts of matter, motion, force, light and the detailed mathematical modelling of change through which it had been expressed. In the course of the eighteenth century, this use of the word physics became widespread. By the time the early historian of science William Whewell used the term 'physicist' in 1840 (Ross, 1962), the discipline of physics was in existence, though it was still denied a place in the university curriculum until the end of the nineteenth century, as mentioned earlier.

From discipline to school subject

Throughout the nineteenth century knowledge in physics advanced, in part due to the identification and solving of new problems revealed as scientific knowledge being put to wider social use during the Industrial Revolution in Britain. The importance of physics was advocated, with

increasing insistence, by sections of Britain's burgeoning class of industrialists. This group was keen to see science established as a university discipline for a combination of both practical and cultural reasons (Williams, 2013). And as mentioned at the start, physics was duly offered as a degree subject at Cambridge and Oxford in 1871 and 1900 respectively.

However, not long after its institutionalization, and perhaps because of the opportunities for greater collaboration and systematization of knowledge and procedures this provided, physics underwent a profound paradigmatic change through the work of Albert Einstein (1879–1955).

Einstein's new principle of motion said that there can be no state of absolute rest in the universe, and his new principles of energy said that energy and mass are two aspects of a single unity. Energy, he claimed, is not to be conceived as continuous, but as phenomena that can be discretely quantified. This led to a statistical, rather than strictly causal, basis to physical laws. Overnight, physics encountered a crisis and Einstein's ideas overhauled the discipline once more, to the extent that Newton's universe became known as Classical Physics while Einstein's was dubbed Modern Physics.

A fault-line was produced in the discipline. Although physics remains ultimately about matter, motion, force and energy, which is to say, conceptual categories of Classical Physics, the work undertaken in research centres today has as its root concepts of Modern Physics, such as conservation laws, symmetries, two Standard Models (of particles and of cosmology) and information distribution (Clark and Webb, 2016). The objects of study and the underlying concepts have been recast so differently from their origins as to become almost unrecognizable. As we shall soon see, this has important implications for education and the re-contextualization of physics for schooling.

Before considering how this re-contextualization might take place, however, it is necessary to introduce two key knowledge differentiations Basil Bernstein (2000) makes. The first, and most fundamental, distinction follows Durkheim's discussion of profane and sacred knowledge. Bernstein refers to the former as everyday, experiential knowledge, which he calls horizontal discourse, and to the latter as more esoteric, conceptually abstracted knowledge of disciplines, which he calls vertical discourse. All disciplinary subjects are part of vertical discourse. After this, Bernstein distinguishes further between the grammar of knowledge in each discipline according to whether it can be categorized as having a hierarchical knowledge structure or a horizontal knowledge

structure, depending on whether knowledge in the discipline proceeds primarily through the accumulation and subsumption of concepts to develop theories or through other methods in which conceptual thought has a different role and place in progressing disciplinary knowledge (found primarily in the humanities or social sciences and, in a more complicated way, the arts).

In the growing body of social realism's literature, physics is classified as a hierarchical knowledge structure. It has a single set of systematic and hierarchical organizing principles that build an entirely coherent structure. Knowledge is advanced by integrating propositions at increasing levels of abstraction – a property, perhaps, due to the growing importance of mathematics in the discipline. This has important educational implications, as suggested by Leesa Wheelahan:

> Physics is often used as an exemplar of a vertical discourse with a hierarchical knowledge structure. Knowledge thus develops (is produced) by generating *new* meanings and integrating them within existing frameworks or revising those frameworks. However, the way knowledge is produced also has implications for the way in which it is reproduced in curriculum at all levels of education. Induction into these disciplines consists of induction into the hierarchical knowledge structure, and progression within the discipline depends on the capacity to integrate meanings at different levels. Students need to understand basic principles before moving on to more complex ones; learning and hence the curriculum is sequential. (2010: 21–2)

Wheelahan quotes a simple formulation from Johan Muller who writes that in physics, the crucial guiding principle handed down from the discipline to the subject is that 'students have to understand what comes before to understand what comes after'. This rigidly and intricately hierarchical structure of physics is its disciplinary element and is what sets it apart from other subjects in the curriculum (apart from mathematics).

A recent overview of teaching and learning in physics throughout Europe describes well what distinguishes physics from chemistry and biology:

> The complexity of natural or technical phenomena is strongly reduced in order to enable quantitative predictions. For this purpose, physics produces its own prototypical phenomena in laboratory settings, often called 'effects'. A basic assumption of

physics is that nature is inherently organised and that the order of nature is essentially accessible to humans. [Galileo] Galilei even asserted that the book of nature is written in the language of mathematics. Real-world phenomena are usually influenced by complex and multiple parameters. Instead, physics phenomena have to be prepared, idealised, reduced or even 'cleaned' in order to enable deliberate manipulations. For example, it is impossible to calculate the motion of a falling leaf, but we can do so with a feather in a vacuum tube. Physics thinking does not originate from the minute observation of the world around us but from a reconstruction of certain aspects of this world under theoretical per-spectives. The role of mathematics comprises the development of models and predictions. Moreover, during the course of the historical development, the meaning of what counts as an explanation has changed by the use of mathematics (Gingras, 2001). While in the 17th and 18th centuries, explaining meant to specify a mechanical mechanism involved in the production of a phenomenon, in the aftermath of this development, mathematical and geometrical ideas were considered sufficient … such a high degree of decontextualis-ation, abstraction, idealisation and mathematization in physics is one of the major reasons for the problems many students have with learning physics. (Duit et al., 2014: 438)

The enormity of the gap between disciplinary physics and school physics raises important questions about the processes of re-contextualization of disciplinary knowledge for educational purposes (Bernstein, 2000) and whether re-contextualization can, or should, be driven by disciplinary considerations alone (Yates and Millar, 2016). This question is beyond the scope of this book, but here it is possible to see how, and why, only a small part of the substantive content of A-level physics approaches the kind of material study undertaken in the disciplinary field.

The description above from Duit et al. provides a central task for school physics, which is the teaching of how to reduce, prepare and clean natural phenomena so that they might be amenable to abstraction, decontextualization, idealization and mathematization. I would also add reinterpretation back into physical realities and prediction. Duit et al. characterize this as a process of elementarization and construction: distilling a set of elementary key features of the content under considera-tion on the basis of which the content structure is then constructed.

A helpful survey of how this has been carried out in schools during the twentieth century is given by Philip Adey (2001). A more

recent study gives a flavour of the context in contemporary physics classrooms. Although conducted by the University of Alabama, I suspect the conclusions would strongly resonate with British physics teachers. The authors found a trend towards traditional lecture-style lessons in which students copied down notes, completed problem sheets for homework and then discussed these in subsequent lessons. Most teachers described their lessons as using practical activities, but their function was different from other sciences:

> There are critical differences in inquiry teaching approaches between physics and biology. Inquiry teaching in physics includes searching for patterns and relationships culminating in modelling, predicting outcomes, and determining the best explanations or models. Inquiry in biology focuses on developing experimental research questions that allow students to understand and communicate cause-effect relationships (Breslyn and McGinnis, 2012). Indicative of their traditional approach, the sample physics teachers extensively used formal methods of summative assessment such as tests, quizzes, and homework rather than performance based projects or portfolios. Formative assessment was rarely observed in lessons or described by teachers. (Sunal et al., 2016: 124)

So, despite the sea change in concepts and radical reorganization of disciplinary physics wrought by the advent of Modern Physics, the teachers' references to enquiry and experiment suggest that the original Newtonian method of gaining knowledge still holds a central place. Einstein did not throw Newton's baby out with his bathwater, at least not in relation to the physics content selected for compulsory schooling, which remains within the purview of Classical Physics, as noted by Duit et al. (2014). This suggests that at school level, introducing pupils to physics is not so much a simplified version of what happens in laboratories of advanced research, but rather an introduction into a revolutionary method through which a more abstract, conceptual and analytical mode of thought has been developed.

If school physics does not directly supply society's future scientists, it is a crucially important propaedeutic educational stage without which it is hard to see from where a society's future quantum physicists (or any physicists) will come. However, physics is more than just this epistemological method or a technique to produce a particular future occupational group (even a highly socially valued group). Its intrinsic worth lies in its facility to enable humans to make greater knowledge

distinctions between, and greater objectification of, natural phenomena and, in the process, allow further insights into the distinctiveness of what differentiates humans from nature. At a general level, this is what a physics teacher who knows his subject would want all pupils, and teachers, to grasp more than any other fact.

More concretely, and in relation to school physics, a good guide for selecting key ideas for a school syllabus can be found in the Association for Science Education's *Teaching Secondary Physics*, which lists them under the headings: energy; sound, light and waves; forces; electricity and magnetism; Earth in space and radioactivity (Sang, 2011). Underpinning them all is the atomic theory, which Richard Feynman believed to be the most valuable scientific knowledge expressible in a single sentence with the fewest number of words – such is its capacity to produce symbols with highly condensed conceptual meanings.

A good physics curriculum will therefore contain a high degree of propositional knowledge: in addition to the substantial amount of theory there is also a large component of philosophy, a questing after some of the most essential human questions. But as physics derives its authority through empirical and not purely rational means, there will also be a good deal of procedural knowledge in the form of practical manipulative skills. Eventually, a form of aesthetic appreciation of colours, forms, sounds and patterns of phenomena develops as the senses become more practised through experiment. This facet, however, takes time to develop and might not be evident at secondary school level.

To conclude this section, my advice to teachers who wish to teach their pupils the best way to understand what Newton and all the other 'giants' meant would be to ensure that what they teach covers the following:

(a) study the fundamental method by which they gained their knowledge (Newton's method of looping induction and deduction)
(b) the areas through which this was carried out: motion, force, energy, light, atomic theory
(c) the specific theories that arose as a result, how they were subsequently modified and why
(d) the historical causes that brought these specific areas into focus.

Some contemporary problems in school physics

There has also been a move away from knowledge *of* physics, towards knowledge *about* physics, particularly its socio-economic, ethical and

political dimensions, often called scientific literacy. This has been characterized as 'science for citizenship' by David Perks, principal of the East London Science School. In his 2006 book *What is Science Education For?* Perks writes:

> [T]he authors of the seminal report *Beyond 2000* (Millar and Osbourne, 1998), which paved the way for the introduction of the new compulsory science GCSE, were clear about their view that the training of future scientists has weighed too heavily on the teaching of science in the past. (Perks et al., 2006: 12)

For Perks, the report's authors' concern with the curricular effects of training future scientists was another way of saying they thought the subject was too difficult for most pupils. The report led to a new syllabus, 21st Century Science, which put a new emphasis on relevance to the student. It represented an attempt to teach *how* scientists develop knowledge but *without the concepts* through which that knowledge has been produced.

To know physics is to do physics. As I have discussed in this chapter, the experimental method is of central importance in physics: it encompasses much more than merely technique or procedural knowledge alone. Therefore, it is extremely problematic when the emphasis of scientific literacy means a turn away from practical work. Perks observes:

> We have already seen the invasion of the ubiquitous interactive whiteboard as the new stock in trade of most secondary school science teachers … There is great pressure on science teachers to turn to PowerPoint presentations or playing DVDs rather than doing experiments. (Perks et al., 2006: 12)

Successive Conservative government education reforms since 2010, including the provision of a new National Curriculum for England, have sought to downplay scientific literacy in favour of more explicit subject knowledge, which, whatever one's politics, can only be a good thing educationally. Yet it remains the case that the most significant areas of research being conducted in physics education, as identified by Duit et al. (2014), are: the aims of instruction; conceptual change (student misconceptions); student interests and gender issues; the efficacy of practical work and the use of multimedia. Research into more curriculum-oriented learning progressions is acknowledged by the authors to be limited in physics. Further investigation of the transfer from discipline

to school subject is conspicuous by its absence, which is somewhat ironic given the authors' observation that 'There is the certain irony that schools appear to be reluctant to take care of this issue, whereas popular science books on modern physics are booming' (Duit et al., 2014: 456).

One good example of a 'bottom up' exchange between subject and discipline, originating in the school lab, is found in C.H. Poon's (2006) 'Teaching Newton's Third Law of Motion in the presence of student preconception'. The author is a teacher of over 30 years' standing, and his paper proposes an alternative way of teaching Newton's most famous law. Popularly recalled as 'to every action there is an equal and opposite reaction', pupils actually tend to learn a version as follows: if body A exerts a force on body B, then B will exert the same magnitude of force back on A. However, this is the kind of elementarization that is not commensurate with the understanding operative in the discipline. It can easily lead to a crude understanding of the nature of force in a student's mind, based on a misunderstanding of how forces arise and a confusion between force and its effects. This comes uncomfortably close to false Aristotelian notions. Poon writes:

> Modern physics describes such interactions as physical processes of particle exchange, making it quite clear that particle–particle interaction has an independent physical reality, and Newton's Third Law applies to the interaction itself, rather than to the particles that are interacting. (2006: 224)

Poon suggests techniques for drawing simple diagrams of the bodies in question, showing how to represent the particles involved and the interactions between them. He then goes on to outline a sequence through which the concept of force as dual-particle interaction can be articulated. Nothing that he proposes is in principle difficult for either a teacher or student. However, in my experience, establishing this particle interaction definition of force early in a student's understanding can have profound effects two or three years later. Students often find Third Law problems at public examination stages notoriously tricky, as they often find it difficult to distinguish the equal and opposite forces as each applying to different bodies and therefore mistakenly try to cancel them out. Poon's method of marking a single interaction between two objects with two force arrows coming from it in two different directions makes it instantly explicit that these two forces are acting on different bodies and cannot be cancelled.

Poon's approach also makes it much easier for students to appreciate contemporary high-energy particle research such as that at the Large Hadron Collider, where forces are understood to be mediated by the interactions of exotic particles. If students conceive forces as particle interactions rather than a mysterious property of objects, they will already intuitively grasp the nature of force-carrying particles such as the Higgs Boson and the data that relate to them.

Poon's paper provides a small, but powerful, example of how a focus on strong disciplinary knowledge combined with the professional experiences of teachers might be more productive for both teachers and educational research. Teachers need to discover a new understanding of the similarities and differences between their work and what goes on in research laboratories and institutions, and what aspects of knowledge from the discipline can be rendered suitable for schooling, while retaining its intellectual coherence. We need to find, or re-find, what is truly unique about what we do, not only within the discipline but within the whole school, and have a robust faith in its intrinsic worth.

I will give the last word to Marie Curie: 'Neither do I believe that the spirit of adventure runs any risk of disappearing in our world. If I see anything vital around me, it is precisely that spirit of adventure, which seems indestructible and is akin to curiosity' (Curie, 2001). In short, physicists need to find anew what makes physics fizz, and pass it on.

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Suggested further reading

On the development of the sciences and scientific thinking, the following provide excellent readable introductions to how human enquiry into nature developed during the revolution in thought in the seventeenth and eighteenth centuries.

Gribbin, J. (2005) *The Fellowship*. London: Penguin.

O'Hara, K. (2010) *The Enlightenment: A beginner's guide*. London: Oneworld Publications.

Wise Bauer, S. (2015) *The Story of Science: From the writings of Aristotle to the big bang theory*. New York: W.W. Norton and Company.

Wootton, D. (2015) *The Invention of Science: A new history of the scientific revolution*. London: Penguin.

Newton is the figure with whom to begin to develop a deeper understanding of physics. Gleick and Ackroyd both give vivid and thrilling accounts of his larger-than-life story, but Gleick in particular also provides a good introduction to his thought. Newton's own writings will be impenetrably difficult to even established teachers, but Rankin's comic-style introduction manages to break down the ideas into digestible chunks of thought-food for the absolute beginner and reflective practitioner alike. For other stars in the physics firmament, Evans and Clegg is an ideal place to start:

Ackroyd, P. (2007) *Newton*. London: Vintage.

Evans, R. and Clegg, B. (2015) *Ten Physicists Who Transformed Our Understanding of Reality*. London: Robinson.

Gleick, J. (2003) *Isaac Newton*. London: Fourth Estate.

Rankin, W. (2007) *Introducing Newton*. London: Icon Books.

For the physics itself, these introductions both have reputations that speak for themselves:

Hawking, S. (2009) *A Brief History of Time*. New York: Random House.

Rovelli, C. (2015) *Seven Brief Lessons on Physics*. Trans. Carnell, S. and Segre, E. London: Allen Lane.

For physics pedagogy, the ASE guide is a classic. Schoolphysics is the simple but excellent website of Keith Gibbs, grandfather of ideas on physics teaching, covering all stages of school education. *Physics Education* is the international teaching research journal from the Institute of Physics and is invaluable, with contributions from both academics and working teachers:

Sang, D. (2011) *Teaching Secondary Physics* (ASE Science Practice). 2nd ed. London: Hodder Education.

For Keith Gibbs' teaching ideas see: www.schoolphysics.co.uk

For *Physics Education* see: http://iopscience.iop.org/journal/0031-9120

14

Mathematics

Cosette Crisan

> *Mathematics provides a powerful universal language and intellectual toolkit for abstraction, generalization and synthesis … It enables us to probe the natural universe and to develop new technologies that have helped us control and master our environment, and change societal expectations and standards of living.*
>
> <div align="right">(Smith, 2004)</div>

This chapter aims to provide the reader with a brief introduction to the origins of the various branches of mathematics. While tracing back these origins, an insight will be offered into how mathematics as a discipline developed throughout many thousands of years and a variety of cultures. Key practices of the discipline of mathematics will be highlighted, followed by a discussion that argues in favour of incorporating these practices into school mathematics.

But first, I will start with a personal account of what school mathematics was for me as a learner. Such experience informed my current view of mathematics – a powerful tool for making sense of the world; an art with its aesthetic appeal; a language with its own syntax and syntactic rules that facilitate precise, concise and rigorous communication; a poetry that I read and 'do' for pure personal enjoyment; and a creative art, with its struggles, frustrations and elations.

A personal account

In my school education, I learnt school mathematics, consisting of facts, rules, results and procedures. I liked 'that' mathematics, as it enabled me to get right answers to the questions that I usually came across in

mathematics textbooks. My mathematics education was further enhanced by opportunities to engage in an act of discovery and conjecture, intuition and inspiration. I have always felt alive when doing mathematics, overwhelmed with joy and excitement when, for example, looking at a geometrical figure I was able to 'see' beyond the drawn diagram and notice mathematical relationships between the elements of a geometrical figure. Similarly, I have always found mathematics expressions fascinating, as they always 'speak' to me in a way that goes beyond simply decoding the written symbolic representation.

I have always taken pleasure in looking at mathematical writing, with symbols and signs stringed together. Even when I cannot immediately (or not at all if the mathematics is too advanced) make sense of what 'the mathematics' is about, a piece of mathematics appeals to me aesthetically but also meaningfully, in that I recognize it as a creation of a human mind, a story that was told and is out there, worth reading, listening to and understanding it if I so wanted.

Adrian Smith's (2004) enquiry into mathematics teaching post-14 affirmed the importance of studying mathematics as: mathematics for its own sake; mathematics for the knowledge economy; mathematics for science, technology and engineering; mathematics for the workplace and mathematics for the citizen. While each one of these arguments in itself is good enough for justifying its study, collectively they illustrate clearly why mathematics education is vital for our progress and development and it should thus be a compulsory aspect of one's education. To these aspects, I would add *mathematics for one's own sake*, as studying mathematics, when a pleasurable learning experience, is a meaningful human experience. Glimpses back into the history of mathematics help us in gaining an appreciation that mathematics is, historically, a relentless human endeavour with twists and turns, many lines of enquiry leading to knowledge development but also to dead-ends, and with resilience and determination in starting again.

Origins and evolution of the various branches of the discipline

The first abstraction in mathematics was very probably that of numbers, needed by prehistoric people not only for counting physical objects but also for counting abstract quantities, like time – days, seasons, years and moon cycles. Early humans used physical objects to represent and communicate their mathematical thinking; among the very earliest

evidence of mankind thinking about and recording numbers is from notched bones in Africa dating back to 35,000 to 20,000 years ago.

Humanity's later preoccupations with measuring land and performing calculations related to taxation and commerce signalled the beginning of what was to become one of the major areas of the discipline of mathematics. **Arithmetic** (from the Greek word *arithmos*, meaning 'number') is thus the oldest and the most elementary branch of mathematics, concerned with addition, subtraction, multiplication and division of numbers.

Geometry (from the Greek *geo*, meaning 'Earth', and *metron*, meaning 'to measure') was introduced in relation to the division of land and measurements. For example, the clay tablets in the British Museum (dating from 1800 to 1600 BCE) provide evidence of the Babylonians' preoccupation with problems involving dividing up an area into parts with different proportions. The methods for solving the 36 problems on the tablets are described entirely in words, as the Babylonians did not have any form of notation available to them. These problems, which would now be formulated as quadratic and cubic equations, provide evidence of early algebra work (Rooney, 2009).

It was not until the middle of the third century that Diophantus (200–300 CE) produced his treatise *Arithmetica*, containing new methods of solving linear and quadratic equations; for his work, Diophantus became known as the 'father of **Algebra**'. The solutions he provided were cumbersome to read, as a symbolic system was not in place yet: there was no symbol for the equal sign, and if more than one solution was yielded by whatever calculation, only the first one was considered; moreover, the solution to the equation $4 = 4x + 20$ was called 'absurd' since, although known to Indian mathematicians in the seventh century, the concept of negative numbers was accepted by the Western mathematicians only as late as the seventeenth century (Burton, 2011: 220).

Just like the Egyptian and Babylonian mathematics, Diophantus was often concerned with solutions of specific, practical problems rather than general solutions of such equations. This did not happen until 500 years later when Muhamman ibn Musa al-Khwarizmi (*c.* 780–850 CE) wrote the treatise called *Al-Kitab al-Jabr wa'l Muquabala* (The Compendious Book on Calculations by Completion and Balancing). The treatise was concerned with algorithms of 'balancing' equations, which the term *al-jabr* (algebra) originally referred to. He also developed quick methods for multiplying and dividing numbers, which are known as algorithms (this word being derived from his name, too).

While the early mathematics was mostly empirical, arrived at by trial and error, with little concern for the accuracy of the results and with no rigour or proofs given for the methods used, Al-Kwarizmi concentrated instead on developing procedures and rules for solving many types of problems in arithmetic. Unlike the Babylonian tablets or Diophantus' *Arithmetica*, his treatise was no longer concerned with a series of specific practical problems to be solved but with clearly defined classes of problems to be solved for finding the values of their *objects of study* (what we would refer to nowadays as the 'unknowns'). From then on, algebra became an important part of Arabic mathematics. It is worth noting that the problems and solutions continued to be written in words, as no symbolic notation was in place. Even the numbers were written out in full!

Although the Egyptians had some knowledge of calculating the slope of pyramids from the height and the base, by the sixteenth century, **Trigonometry**, the branch of mathematics concerned with calculating angles and lengths of sides of triangles, became an area of mathematics independent of geometry, despite relying on it (Rooney, 2009).

A profound change occurred in the nature and approach to mathematics with the contributions of Greek scholars, as they made a distinction between the practical arithmetic of everyday life and the higher pursuit of mathematics and logic for solving purely abstract problems. The discovery of Pythagoras' theorem, for which the Greeks had a proof, led to the 'discovery' of irrational numbers when the theorem was applied to isosceles right-angled triangles. The Greeks themselves were quite displeased with their finding, given that they thought a number was 'the ratio of two whole numbers' (conceiving thus rational numbers as abstractions of proportions). Over time, some irrational numbers were accepted by the Greeks, as long as they were constructed with the basic instrument of a geometer (the straightedge and compass), such as square root of 2.

The greatest work of Greek mathematicians, however, remains Euclid's *Elements* (*c.* 300 BCE). Euclid presented five common notions and five axioms and deduced from them many theorems and results that were proved by using the principle of logical deduction. The effort to axiomatize geometry shows that mathematics never was a perfect or an exact science. Euclidean geometry was thus the first branch of mathematics to be systematically studied and placed on a firm logical foundation and it is still being studied in schools currently as a model of logical thought.

The concepts in Euclid's geometry remained unchallenged until the early nineteenth century when mathematicians realized that Euclid's geometry could not be used to describe all physical space and so other types of geometry emerged. Non-Euclidean geometry is an extension of Euclidean geometry and it arose from a purely intellectual effort of mathematicians to prove that the fifth postulate (the parallel axiom) could be derived from the other four. Lobachevsky, the founder of this new geometry, labelled his geometry 'imaginary', since he could not see any application of it to the real world. The results of his geometry appeared to the majority of mathematicians to be not only 'imaginary' but absurd. Nevertheless, years later, non-Euclidean geometry turned out to be an indispensable tool for Einstein's revolutionary rein-terpretation of the gravitational force, becoming the basis of the general theory of relativity.

In trying to improve the accuracy for the purpose of calculating the area of a circle through using ever-larger numbers of sides for the inscribed and circumscribed polygons, Archimedes (*c.*287–*c.*212 BCE) encountered two new concepts – that of *limit* and that of *infinity*. These new concepts were further applied by mathematicians of the sixteenth century for calculations of areas under curves. Isaac Newton and Gottfried Leibniz independently developed the foundations of **Calculus** (from the Latin *calculus*, meaning 'pebbles' as used on an abacus), by bringing together techniques through the derivatives and integrals. Although considered the greatest tool ever invented for the mathematical formulation and solution of physical problems, during the seventeenth and eighteenth centuries calculus was plagued by inconsistencies; the concepts of limit and infinity carried complex meanings, which were interpreted in inconsistent ways.

Whereas at first mathematics was created for the investigation of nature, by the nineteenth century, mathematics in general became ever more complex and abstract. It continued to develop through the pursuit of problems independent of science, 'losing' grounding in reality. There was concern about the structure of mathematics and so there was a greater emphasis on mathematical rigour through a careful analysis of arguments put forward and formal proofs. One such attempt was that of Nicolas Bourbaki (a collective pseudonym for a group of mainly French twentieth-century mathematicians) who formulated mathematics on an extremely abstract and formal but self-contained basis, laying the foundations of another branch of mathematics, namely **Analysis**.

The next major development in mathematics, one that unites arithmetic, geometry, algebra and analysis, is the notion of continuous

function through its use in modelling physical and geometric situations and its manipulations and analysis using algebra and arithmetic.

People always gambled, and fortunately some of the mathematicians of the seventeenth century took an interest in these games, too. A gambler's dispute about a popular game of dice in 1654 led to the creation of the mathematical theory of probability, when two famous French mathematicians, Blaise Pascal and Pierre de Fermat, were asked to look into an apparent contradiction concerning the dice game. Intrigued by the obvious observations they noted, the two mathematicians set out to explain them rigorously and so a new area of mathematics was born, namely **Probability.** A mathematical theory of probability was not achieved until a sufficiently precise definition of probability in mathematics was put forward (which took almost three centuries), one that was comprehensive enough to be applicable to a wide range of phenomena. The notion of chance events started being accepted by mathematicians, who until then mainly looked for regularity in mathematics. In 1933, in a monograph by a Russian mathematician, A. Kolmogorov, a treatment of probability theory on an axiomatic basis was outlined. Further developments in this field and refinement of ideas lead to probability theory now being part of a more general discipline known as Measure Theory.

Statistics had its origins in the analysis by John Graunt of weekly burial records in London, which he published in 1662. Although as a discipline statistics uses mathematics and probability, there continue to be disputes over whether or not statistics is a sub-field of the discipline of mathematics (see Ben-Zvi and Garfield, 2004, for an argument towards recognition that statistics, while a mathematical science, is not a sub-field of mathematics).

In addition to the standard fields already mentioned here, arithmetic, number theory, algebra, geometry, analysis (calculus), mathematical logic and set theory, and the more applied mathematics fields such as probability theory and statistics, an ever-growing list of newer branches of mathematics could be produced. The discipline of mathematics now covers an ever-increasing array of specialized fields of study, such as group theory, knot theory, topology, differential geometry and fractal geometry, to mention just a few.

This very brief overview of the origins of the various branches of mathematics, usually encountered through one's schooling, does much injustice to many other civilizations and mathematicians who made significant contributions to mathematics. In writing this brief overview I had no intention of favouring some people's ideas in the discourse of

mathematics while denying others; any other selection would have inevitably favoured some peoples' ideas over others. Within the limited space of this chapter I wanted to portray a view of mathematics as a discipline in its own right, as a body of knowledge that evolved over time as a human activity, through cumulative contributions from many mathematicians all over the world, giving rise to mathematical developments that are now part of humanity's heritage.

Mathematics as a discipline

A discipline is an organized, formal field of study that is defined by the types of problems it addresses, the methods it uses to address these problems and the results it has achieved. The structure of the discipline is about how knowledge is organized and pursued in a particular subject area (Winch, 2013).

The current abstract and highly specialized state of mathematics is the result of the evolution of the subject through human endeavour: from empirical mathematics that involved counting, calculations, measurements and the study of properties of shapes and motions of physical objects to the more abstract ideas and problems that may or may not have roots in real, physical problems and whose solutions push the development of mathematical thinking, creating new areas of mathematical enquiry.

We have seen how mathematicians became concerned that the structure of mathematics built over centuries did not have a solid foundation. In many such instances throughout history they showed resilience and started again, from the ground, looking for rigour, consistency and effective and unambiguous formalisms. Much of the structure of mathematics was strengthened over the years, despite the cracks that continued to appear. It was the goal of Hilbert's Program in the 1920s to put all of mathematics on a firm axiomatic basis, but we now know that there are propositions in mathematics that cannot be proven to be either true or false (Godel's Incompleteness Theorem, 1931), telling us that we cannot create an axiomatic system that is free from contradiction.

This, however, did not deter mathematicians in their quest for developing mathematics as an abstract intellectual pursuit (a theoretical discipline) as well as a subject with real-life applications (an applied discipline). Mathematicians' main concern is with thought, abstractions and thinking about abstract ideas in seeking to solve problems that

originate in the real world or problems whose solutions have no material consequences other than the advancement of mathematical knowledge per se; history tells us that very often knowledge, in the end, found real-life applications (e.g. Mandelbrot's fractal geometry remained 'pure mathematics' for much of his 35-year-long career but became 'applied mathematics' in many fields such as statistical physics, meteorology, anatomy, taxonomy and neurology, to mention just a few).

Abstractions enable mathematicians to concentrate on some features of things, such as noticing a similarity between two or more objects or events. After abstractions have been made, mathematicians select some symbolic representations for their ideas, such as numbers, letters, other marks, diagrams, geometrical constructions or even words. Mathematical symbolism takes abstraction to another level. The symbolism of mathematics was needed in order to achieve complete precision in meaning and rigour in reasoning. Such symbols are more readily and easily manipulated by mathematicians in reasoning than if they were to use symbols of common language. The symbols can be combined and recombined in various ways according to precisely defined rules. Manipulating the abstractions through deductive reasoning often results in the identification of new relationships, leading to the discovery of new knowledge and/or to testing for the validity of new ideas and/or to the discovery of 'truths'. Mathematics does not express 'true propositions' in any absolute or empirical sense but rather the truth in mathematics is achieved through logical reasoning within a particular axiomatic system.

The many axiomatic systems – for geometry (e.g. Euclid, Hilbert, Birkoff), for natural numbers (Peano's axioms) and for set theory (e.g. Zermelo-Fraenkel Set Theory) to mention a few – show how mathematics has become increasingly independent of experience and hence an abstract intellectual endeavour. However, mathematicians do not generate new knowledge by setting up axioms and using them in order to provide watertight arguments. History tells us that mathematicians have always engaged imaginatively with problems that become of interest to them for one reason or another. We learn from the vast literature on the historical developments in mathematics that 'doing mathematics' has always been about mathematicians' creativity, intuition, assumptions, conjecturing, generalizing and abstracting, persisting, making links, arguing, justifying and proving, about conversations, debates, different points of view, struggles, dispelling paradoxes by reason, breakthroughs but also being ambiguous, reworking to find errors in arguments and pushing the boundaries.

These are important lessons about mathematics as a discipline that we learn from the past and inform what (as well as when and how) should be passed on to the new generations.

The discipline of mathematics reflected in the school subject

Since its origins, mathematics has evolved to become a discipline that is concerned not only with the development of *substantive knowledge* (the key facts, concepts, principles, structures and explanatory frameworks in a discipline) (Shulman and Grossman, 1988) but also *syntactic knowledge* (the rules of evidence and warrants of truth within that discipline, the nature of enquiry in the field and how new knowledge is introduced and accepted into the community).[1]

Inevitably, the school subject will be a 'simplified' form of the discipline and curriculum designers would take decisions as to how best to present a discipline to school children. In Bernstein's (2000) terms, school mathematics is a pedagogic discourse, formed by the re-contextualization of other discourses, including that of the discipline of mathematics but also other discourses such as theories of learning and teaching. Thus, in the case of school mathematics, its purposes and the interests of those participating in it are different from those of mathematicians. While this chapter is not concerned with the construction of a curriculum, it does put forward a view of the school mathematics that is different from but related to the discipline of mathematics. They are related in that school mathematics too is concerned with *substantive knowledge* (learning mathematics) and *syntactic knowledge* (disciplinary practices). They are different since school children should not be expected to learn the same substantive knowledge that concerns mathematicians, but rather a breadth and depth of substantive mathematical knowledge that is accessible to them according to their experience. They are similar in that school children should be able to experience the syntactic knowledge that led to development of the discipline of mathematics, at a depth and breadth accessible to them according to their experience.

School mathematics and disciplinary practices

Insights into the chronological development of various branches of the discipline of mathematics throughout history should reflect the content

of mathematics that students learn about at school. Students should become fluent in the various branches of the discipline through development of a conceptual understanding and the ability to recall and apply knowledge as and when needed.

Fluency is an important aspect of studying school mathematics and it does involve practising various common problem-solving techniques, memorizing some formulae and important results, and learning how to apply these concepts and skills to solve problems, all of which will give entry points in tackling new problems. However, there is a difference between 'fluent' performance and 'mechanical' performance. 'Fluent performance is based on understanding of the routine which is being carried out; mechanical performance is performance by rote in which the necessary understanding is not present' (Cockcroft, 1982: 70). To be mathematically fluent requires sufficient depth of conceptual understanding to be able to recognize when and how to apply existing knowledge. It also requires an understanding of how knowledge is connected; otherwise knowledge remains as fragmented, disparate and not used unless in circumstances that clearly specify what knowledge is needed.

With a view that mathematics is more than a collection of disparate topics under broad headings such as number, algebra or geometry, Cuoco et al. proposed a 'habits of minds curriculum' that aims 'to close the gap between what the users and makers of mathematics *do* and what they *say*'(1996: 2). Indeed, to do mathematics as mathematicians do it, school students should have opportunities to learn how to bring together different aspects of their knowledge and how to apply their mathematical skills in tackling a variety of mathematical situations (routine and non-routine, within and outside mathematics). They will also need to learn how to proceed in attacking problems where there is more than one path leading to the solution, where paths they try will not always work, where different strategies might be needed before finding out what works. They need to be able to reason mathematically, justifying why a line of enquiry is successful. In the re-contextualization of the disciplinary knowledge into school knowledge (Bernstein, 2000) the messiness and struggles of disciplinary debates and divides is often hidden. While we do want to present school children with a coherent picture of what mathematics is, there is much to be gained in acknowledging that doing mathematics is about being inquisitive, being resilient and persistent when ways forward are not clear, talking to others, refining explanations and solutions, and listening to and learning from others' insights.

For such communication to take place, pupils will need to acquire and become fluent in using the mathematical language, both written and spoken. Becoming fluent in using the mathematical language takes time and it requires practice in using the symbolic, formal and technical language and operations.

While children in schools learn about relatively simpler mathematical concepts and principles than those of the discipline of mathematics, they should have opportunities to learn and adopt some of the ways mathematicians do mathematics: through discovering patterns, formulating conjectures, making links, abstracting, generalizing, presenting convincing arguments, justifying and proving, thus helping them develop a conception of mathematics as an intellectually rewarding discipline. The next section thus exemplifies how some of these disciplinary practices could be made part of children's learning of school mathematics.

Disciplinary practices in learning school mathematics

School mathematics introduces pupils to the various branches of the discipline of mathematics through concrete experiences such as counting and measuring. Children learn about numbers, introduced to them initially as mathematical objects based on the empirical idea of quantity, then as abstractions in an axiomatic system that are independent of the idea of quantity, namely the real (and, in the later years of schooling, the complex) number system with real number properties, including ideas about infinity and infinite and infinitesimal processes. Children at even a young age engage with the abstractness of mathematics and they will soon recall multiplication facts such as $3 \times 2 = 6$ as multiplications of abstract numbers, instead of the earlier concrete experience of calculating the number of apples eaten if three apples are eaten by each of the two pupils. Gradually, over the years, children's mathematical concepts will have fewer and fewer links to experience, as they learn to operate with concepts of greater abstraction.

Geometry is another domain of mathematics where points and lines are used and thought of as abstract concepts, as idealized physical objects; points have no thickness, no size as such. Similarly, children develop concepts of a geometric figure as a result of abstraction from all the properties of actual objects, except their spatial forms and dimensions. In the early years of geometry education, the focus tends to be on shapes and solids. Then it moves on to properties and relationships

of shapes and solids. Children should have opportunities to engage with geometrical reasoning from a young age, by trying out different representations involving visualizing, sketching, constructing accurate diagrams, building models, both physical and virtual, calculating and estimating lengths, areas, volumes and angles.

As abstract thinking progresses, geometry becomes much more about analysis and reasoning. Children will continue to develop their geometric reasoning skills by, for example, using a dynamic geometry environment to transform the image of mathematical objects and identifying what changes and what stays the same. Changing the size of a triangle by dragging its vertices leads to noticing that the sum of the interior angles of each of the newly formed triangles equals 180 degrees. Children should be aware of the strength of empirical evidence and appreciate the difference between evidence and proof. Wondering if this relationship holds for any triangle 'out there' leads on to advancing a conjecture about the relationship between the sizes of the interior angles of *any* triangle, thus detaching their reasoning from the particular cases observed and moving towards developing a chain of reasoning to prove or disprove the conjecture advanced.

Developing children's understanding of mathematical proof and deductive reasoning needs to be supported from early on in their school education. Empirical approaches to exploring mathematics encourage learners to develop an understanding of the need for a proof. In primary school, proofs could take the form of explanations of (mainly) number patterns, while at secondary school, children should be made aware of different types of proofs (visual, algebraic, geometric) as methods to certify not only that something is true but also why it is true.

Nowadays, for most learners in secondary schools in the United Kingdom geometry is mainly about 'shape and space' without reason, deduction or proof, the focus instead being on calculations of lengths, perimeters, areas and volumes. Words such as assumption, axiom, given facts, conjecture, deduction, proposition, conclusion, statement and theorem are only briefly mentioned or not at all in mathematics textbooks. School children need opportunities to engage with proofs and the abstract. Proof is a fundamental component of the discipline of mathematics and so it should be part of mathematical education in schools. Polya (1990) suggested that Euclidean geometry was never on the curriculum for pupils to know about geometric facts themselves, but rather for pupils to learn about and experience logical reasoning, without which 'he [sic] lacks a true understanding with which to compare alleged evidence of all sorts aimed at him in modern life' (1990: 127). Each discipline has a

different conception of what constitutes evidence or 'proof'. In the discipline of mathematics, it is not acceptable to justify a claim based solely on example data. Mathematicians want theorems to follow from axioms of a given system by means of logical deduction; when building a proof, the argument is clearly developed, and each step is supported by a property, theorem, postulate or definition.

The mathematical notation we use today was not invented until the sixteenth century. It came about from the realization that mathematics requires more precision than use of everyday language and has since been continuously refined and further extended to accommodate new developments. What is hidden from sight and must be taught and learnt by children is an appreciation of 'how empowering symbols can be in expressing generalities and justifications of arithmetical phenomena' (Arcavi, 1994: 33). For example, let us consider the Hockey Stick Theorem, which states that if a diagonal of numbers of any length is selected starting at any of the ones at the sides of Pascal's triangle and ending on any number inside the triangle on that diagonal, the sum of the numbers inside the selection is equal to the number below the end of the selection that is not on the same diagonal itself. Figure 14.1 is an attempt to exemplify this theorem, assuming that the reader is already familiar with Pascal's triangle.

Looking at the shaded numbers in Pascal's triangle, notice that they create a *geometrical pattern* similar to a hockey stick, hence the name of the
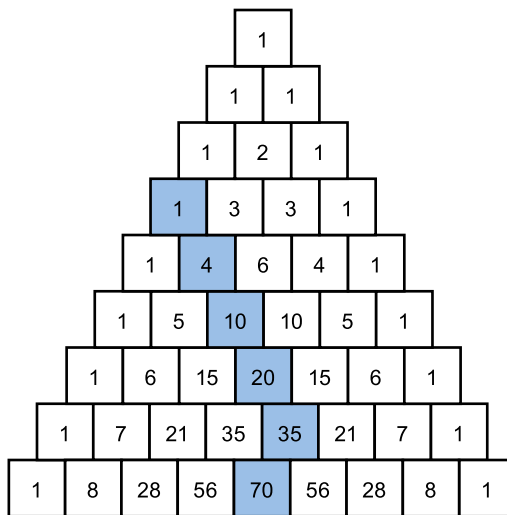
Figure 14.1   Pascal's triangle (image by the author)

theorem. Also notice the *numerical relationship* within this hockey stick, namely $1 + 4 + 10 + 20 + 35 = 70$. A fun fact to notice in this triangle!

Each number in Pascal's triangle also has a symbolic notation assigned to it. For example, the notation $\binom{5}{2}$ is assigned to the shaded number 4, since this number is located on position 2 in row 5. Similarly, the shaded number 10, being on position 3 in row 6, could also be represented by $\binom{6}{3}$ Using this symbolic notation, the *numerical relationship* in the shaded hockey stick above could now be expressed as $\binom{3}{0} + \binom{4}{1} + \binom{5}{2} + \binom{6}{3} + \binom{7}{4} = \binom{8}{4}$. But this is just an instance of all possible hockey sticks in Pascal's triangle where similar numerical relationships hold true. Using *algebra* and the helpful notation introduced earlier (together with the sigma symbol to mean addition), this generalization could be described as $\sum_{i=0}^{k} \binom{n+i}{i} = \binom{n+k+1}{k}$. Thus, the rather convoluted wordy description of the Hockey Stick Theorem above is now encapsulated in this concise format, enabled by the use of symbols and notations. Empowering and beautiful!

While doing algebra in school mathematics consists of learning to manipulate algebraic expressions, emphasis should be placed upon algebraic thinking and its power to generalize and abstract from particular cases. At the heart of algebra is generalizing mathematical ideas, representing and justifying generalizations in multiple ways and reasoning with generalizations (Kaput, 2008). Algebra is about solving problems employing rules and routines with an understanding of the rationale and deduction of those rules, and not about just solving particular problems employing memorized rules and routines.

A consistent finding of research in mathematics education is that the basis for using algebraic symbolization successfully is not just learning the rules of the language but also understanding the underlying operations and relations and being able to use symbolism correctly. When solving equations, for example $2x - 3 = 149$, negative 3 is not moved over to the other side of the equation, changing the sign while doing so, to give $2x = 152$. Terms just do not fly over the equal sign, changing the sign; one can do this because there is a mathematical reason behind it (adding the same quantity to both sides of the equation keeps both sides of the equation 'in balance') and thus children should be supported to develop an understanding of how the operations combine and relate to each other.

Mathematical language is more than a language, which facilitates expression and communication using written and spoken symbols. It uses everyday words, but not with their everyday meaning. For example, some mathematical words are shared with English and have comparable meanings: for example, *difference* in mathematics means

the answer to a subtraction problem, while in English *difference* is used as a general comparison.

Justification and argumentation are disciplinary practices because they are the means by which mathematicians validate new mathematics. Several authors emphasize the importance of learning to speak like a mathematician in order to take on the identity of a mathematician (Holland et al., 1998; Wenger, 1998). In school mathematics, written and oral argumentation and justification should be part of learning mathematics because they have been shown to support children's understanding of mathematics and their proficiency at doing mathematics. Indeed, Wood et al. propose that 'these practices are not just a desirable end product or outcome of a mathematics education; they are a means by which to learn and do mathematics' (2008: n.p.).

School children should have opportunities to develop a language with which to describe what they see and to explain their thinking. Thus, I am in utmost agreement with Pimm's view that 'children need to learn how to mean mathematically, how to use mathematical language to create, control and express their own mathematical meanings as well as to interpret the mathematical language of others' (1995: 179).

The value of mathematics

Viewing mathematics as a 'tool' subject that equips children with the skills for solving problems is a good reason for its inclusion in the school curriculum. This utilitarian view of mathematics was represented in the construction of the school curriculum for mathematics in England over the years (see Ernest, 1991). However, there is an imperative need for recognizing the intrinsic value of mathematics as a school discipline. By studying mathematics school children will be introduced to great ideas and controversies in human thought and experience the discipline of mathematics. Smith succinctly and powerfully summarized the value of mathematics in one's education:

> Mathematics provides a powerful universal language and intellectual toolkit for abstraction, generalization and synthesis. It is the language of science and technology. It enables us to probe the natural universe and to develop new technologies that have helped us control and master our environment, and change societal expectations and standards of living. Mathematical skills are highly valued and sought after. Mathematical training disciplines the mind, develops logical

and critical reasoning, and develops analytical and problem-solving skills to a high degree. (2004: 11)

Teaching mathematics for its disciplinary and intellectual value aims at providing training to the mind of learners and developing intellectual habits in them. School children will be empowered in expressing, justifying and arguing their views through logical arguments. They will be able to construct arguments through the power of reason, developing themselves as liberal citizens.

Note

1   This latter type of knowledge is equivalent to *procedural knowledge*, a term used throughout this book; however, mathematics education researchers usually define procedural knowledge in terms of knowledge type – as sequential or 'step-by-step [prescriptions for] how to complete tasks' (Hiebert and Lefevre, 1986: 6).

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Smith, A. (2004) *Making Mathematics Count: The report of Professor Adrian Smith's inquiry into post-14 mathematics education*. London: HMSO.

Wenger, E. (1998) *Communities of Practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

Winch, C. (2013) 'Curriculum design and epistemic ascent'. *Journal of Philosophy of Education*, 47 (1), 128–46.

Wood, T., Staples, M., Larsen, S. and Marrongelle, K. (2008) 'Why are disciplinary practices in mathematics important as learning practices in school mathematics?'. Paper presented at the ICMI Symposium on the occasion of the 100th anniversary of ICMI (Working Group 1: Disciplinary Mathematics and School Mathematics), Rome, 5–8 March 2008.

Suggested further reading

On the nature of mathematics:

Ernest, P. (1991) *The Philosophy of Mathematics Education*. London: Falmer.
Hersh, R. (1998) *What is Mathematics, Really?* London: Vintage.
Joseph, G. (2000) *The Crest of the Peacock: Non-European roots of mathematics*. London: Penguin.
Singh, S. (1998) *Fermat's Last Theorem*. London: Fourth Estate.

On issues in mathematics education:

Johnston-Wilder, S., Johnston-Wilder, P., Pimm, D. and Westwell, J. (2005) *Learning to Teach Mathematics in the Secondary School: A companion to school experience*. 2nd ed. London: Routledge.
Leslie, D. and Mendick, H. (2013) *Debates in Mathematics Education*. London: Routledge.
Morgan, C., Watson, A. and Tikly, C. (2004) *Teaching School Subjects 11–19: Mathematics*. London: RoutledgeFalmer.

On the mathematics curriculum:

Bramall, S. and White, J. (eds) (2000) *Why Learn Maths?* London: Institute of Education.
Cockcroft, W.H. (1982) *Mathematics Counts: Report of the committee of inquiry into the teaching of mathematics in schools*. London: HMSO.
Dowling, P.C. and Noss, R. (eds) (1990) *Mathematics versus the National Curriculum*. Basingstoke: Falmer.
Hoyles, C., Morgan, C. and Woodhouse, G. (eds) (1999) *Rethinking the Mathematics Curriculum*. London: Falmer.

On the history of mathematics:

Katz, V.J. (1999) *A History of Mathematics: An introduction*. 2nd ed. (corrected). Harlow: Addison-Wesley.

Some useful websites:

Association of Teachers of Mathematics	http://www.atm.org.uk
Mathematical Association	http://www.m-a.org.uk/
NRICH Maths	http://www.nrich.maths.org
National Centre for Excellence in the Teaching of Mathematics	http://www.ncetm.org.uk

Conclusion
Alka Sehgal Cuthbert and Alex Standish

> *Curriculum is our way of helping children to look out into the world as conscious, perceiving, thinking and questioning human beings who are able to act upon and within the world, taking care and responsibility for it and each other. How we bring the subjective human back to being the central concern for schooling is through an unyielding focus on curriculum.*
>
> (Robinson, 2019)

This book has been an attempt to draw on key theoretical insights from the new field of social realism in order to provide an account of what disciplinary knowledge looks like in different subjects and what general principles for teaching, and pedagogy more broadly, can be derived from this way of thinking about knowledge. In this understanding of knowledge, disciplinary knowledge requires certain conditions over and above everyday experience for its existence. Or at least this is the case if disciplinary knowledge is to be substantively, rather than rhetorically, manifest. One important condition is that teachers, educators more broadly, and education policy-makers understand what disciplinary knowledge entails in terms of its public value in truth-seeking. A commitment approaching that of an ethical value is needed to make it the central organizing principle of educational policy and practice.

Reclaiming the place of disciplinary knowledge in the curriculum

With the 'turn to knowledge' noted in the introduction, it is clear that schools are now giving more thought to the content of their curriculum. Hopefully, this means that teachers have moved beyond the days of 'learnification' whereby the process of learning was prioritized over the

content and purpose (Biesta, 2010). In the introduction, we also drew attention to the growth and range of instrumentalist thinking with respect to the curriculum. This includes 'teaching to the test' and the culture of performativity that in some schools has turned examinations into educational ends. Biesta questions the normative validity of the focus on data and results by asking 'whether we are indeed measuring what we value, or whether we are just measuring what we can easily measure and thus end up valuing what we (can) measure' (2010: 13). What gets missed with this short-sighted approach is education's moral and subjective dimensions, as educational improvement becomes synonymous with qualification outcomes.

While qualifications have an important, but *narrow*, social function, it is important to remember that the *broader* social function of education also entails recognizing that the transformation between a collection of atomized individuals and a social collective needs to be engendered through the *intentionality* of individual citizens (Searle, 1995). Education's most general role, then, is to ensure the next generation is knowledgeable not only in factual matters of nature and society but also in the crucial question of what makes facts about these phenomena meaningful.

Hence, we echo Robinson's call to 'Bring the Human Back In' to curriculum. This necessitates developing a language, rationale and conceptual apparatus for thinking about the curriculum in relation to the formation of individuals – the whole person. This does not mean turning the clock back but rather drawing on existing traditions and theory to inform teacher education and curriculum development for curriculum conversations about knowledge and what it means to be human in the twenty-first century. What children learn will hopefully stimulate curiosity, passion, thought and agency: 'This inner life is a place that we nurture and cultivate through our interactions with the world and with each other' (Robinson, 2019: 87). Education as a transformative experience, rather than as a means to achieve individual or group interests, is not tied to specific social or economic ends, but rather it transforms our capacity to comprehend and interact in the world.

Truth, freedom and pedagogy

There are two ethical values that underpin disciplinary knowledge and selection of curriculum content, its mode of teaching *and* the pedagogic relationships required: *truth* and *freedom*. In his essay *Truth and Truthfulness*, Bernard Williams proposes that truth is the basis for

the authority of scholarship, at all levels of education: 'you do the best you can to acquire true beliefs, and what you say reveals what you believe' (2002: 11). Epistemology distinguishes between truth and justified true belief (Martin, 2020). The latter takes place within scholarly communities where truth claims are justified as true, partially true, true once but no longer, or rejected as false. Schools, on the other hand, especially at lower ages, are concerned more with truthful knowledge than justifying true belief. Clearly, as pupils progress the possibility of more points of contact between disciplinary and school knowledge increases.

In Chapter 1 we showed that pursuit of truth is what distinguishes disciplinary knowledge from everyday knowledge. Subsequent chapters explored how each subject explores a domain of human experience and its claims to objectivity and truth. Here, we saw that, depending upon the object of study, truth can be subjective or objective, and truthful knowledge takes different forms in sciences, arts and humanities subjects. What matters for a beginning teacher is to understand how your subject explores an aspect of truth and the procedures by which truth claims are verified within the discipline, both of which will be communicated to pupils through your teaching. And, scholars and teachers must also live with an understanding of the fallibility of our accounts of truth, which is another lesson that pupils need to learn over time.

In this vein, Michael Fordham (2016) suggests that teachers can be conceived as *practitioners of a discipline*, which is different from being practitioners *within* a discipline where the aim is to improve the existing state of knowledge rather than to select and re-contextualize aspects of disciplinary knowledge for school purposes. Nonetheless, drawing on Alasdair MacIntyre's writing, Fordham notes that teachers and most university academics 'are united in some common telos' (2016: 424). In other words, they are working towards the same goal, which is under-standing and communicating a specialized domain of knowledge. As each of the subject authors illustrate, thinking and ways of working are unique to each discipline, although there are areas of correspondence according to their structure: hierarchical, horizontal or aesthetic.

Thus understood, subjects based on disciplinary knowledge contain intrinsic pedagogic principles that need to be observed by teachers and pupils if the subject is to be taught, and to a large degree learnt, in any meaningful way – that is to say, according to the epistemological relations that inhere within each subject, as the chapters indicate.[1] Thus, while there may be some generic principles that are applicable across subjects, pupils deserve to be taught by subject specialists. Although subject knowledge is included as one of the teaching standards, it should not be

viewed as a competence and cannot be 'delivered' without links to the subject's disciplinary features and ways of thinking and working. The specialized nature of knowledge in each discipline and the pedagogical content knowledge that teachers acquire through teaching their subject to pupils mean that educational professionals are the best people to oversee the curriculum and teaching practice, and hence they need to be given the freedom to do this. This does not mean the absence of accountability but rather creating a space for professional autonomy.

A degree of freedom from systematic, rule-bound procedures is required that runs counter to contemporary cultural trends seeking certainty and replicability (Marshall, 2016). Presently, beginning teachers are inducted into a conformist pedagogy through conventions such as the three-part lesson (starter, main, plenary), behaviour management techniques like Do Now as pupils arrive for class, assessment for learning, writing frames, literacy strategies like key words, and so forth. While each of these may have pedagogical value at a given point in time, they become a problem when they dictate decision-making rather than being tools for the teacher to employ as they see fit. Toby Marshall identifies three reasons why teachers need professional autonomy to make their own decisions in the classroom:

> The imposition of any method undermines that most crucial of all education resources: a teachers' sense of ownership and responsibility over that which takes place in the classroom. Secondly, it restricts their capacity to respond creatively to the particular intellectual needs of their pupils. Thirdly, it creates a wider culture of pedagogical conformity, which stifles both innovation and creativity. (2016: 41)

Some thoughts on school subjects

Chapter 2 considers the general relationship between disciplines and school subjects.

One key difference between disciplines and subjects the author highlights is that the social function of schools and universities is different and so too is their orientation towards disciplinary knowledge. Curricula at university level is orientated towards inducting students, who are, by most social and legal norms, adults, into knowledge, modes of thought and practices needed to participate in disciplinary conversations that, ultimately, contribute to improving knowledge in their field.

The pedagogic relationships between lecturers and students, especially as students advance through their study, are likely to be collegial as well as authoritative (the authority being based more exclusively on academic and intellectual quality rather than personal attributes).

Schools, on the other hand, have two specific functions: the first is to introduce pupils, not yet adults, to a broad range of subjects that comprise a major part of their curriculum. These subjects have been selected and re-contextualized systematically, in the light of both disciplinary, broader social requirements and insights from developmental psychology, especially language acquisition. Here, there are points of contact with the disciplinary work of universities.

The second, applicable more directly to schools than to universities, is that schools play a distinctive role in *exemplifying* social norms of ethical conduct conducive to living in a pluralistic democratic society. Our considered view is that this ethical task is better met through a commitment to knowledge and truth as argued in this book. The curriculum model we propose encompasses both cognitive development *and* epistemological virtues and dispositions that encourage the liberal cultural value of tolerance and its predicate, judgement (Levinson, 1999; Zerilli, 2005).

Schools neither produce new knowledge nor transmit knowledge narrowly conceived. Instead, we propose schools should provide a propaedeutic introduction to the reality of ideas as they exist systematically in different disciplines. The chapters on specific subjects illustrate key features of their disciplinary parent: these provide important principles from which substantive content can be selected. We can see how the arts focus on strengthening powers of interpretation by which abstract knowledge is internalized, and maybe there is not much to be gained by trying to shoehorn it into a Bernsteinian structure. The arts have points of contact with a discipline like history, which also requires interpretation, where new, better interpretations integrate, or shed fresh light on, established ones. The empirical base of social science has its functional equivalent in aesthetic experience. Subjects with hierarchical knowledge structures, on the other hand, focus on logical and analytical thought, as well as empirical, experimental validation procedures needed to better understand the external physical and social world.

For this second edition, all but two of the subject chapters have been revised to take account of new developments either within the curriculum and/or within wider debates that play a constitutive role in horizontal and aesthetic knowledge structures. Mathematics and physics, the exemplars of hierarchical knowledge structures, are the two subjects

that remain unchanged. This is unsurprising considering how knowledge develops in these disciplines and the time it can take for hypotheses to be subjected to better testing and verification.

Each subject has its unique features, but taken together, they all contribute to the ability of pupils to understand *the reality of intellectual and imaginative work*. The implication of our argument suggests that the supervening orientation of the school curriculum, at the level of compulsory education, should be towards the generalist rather than the specialist. The caveat is that each subject *within* the curriculum offers something of specialized knowledge, without which a generalist curriculum is likely to be ill-defined, confused and, for many, confusing. Following from this, it makes sense for schools to provide opportunities for departments to come together to discuss the relationship between their generalist and specialist curriculum, and indeed, some schools are beginning to do so.

Some thoughts on teacher authority

The turn to knowledge has prompted a consideration of important educational questions. In addition to the centrality of the curriculum, there is a recognition that the profession needs to regain public authority, which, for various reasons, has been weakened in certain circles. At present, means of improving the authority of teachers, or the behaviour of pupils, are more commonly sought in research, which aims to emulate the language, criteria and methods borrowed from the natural sciences, and statistical analysis in particular (Sehgal Cuthbert, 2015; Smeyers, 2016). Statistical analysis is assumed to be a gold standard of verification, as it underpins so much of the theoretical work garnered through scientific experimentation (as the chapter on physics demonstrates). Additionally, technical advances in brain scanning equipment have allowed researchers to capture neural activity in real time and in more naturalistic settings.

From such developments, some researchers have concluded that new breakthroughs in our knowledge of learning that are 'classroom-ready' are due to new knowledge about the brain (Carew and Magsamen, 2010). A further extrapolation from this view is that teachers should aim to be researchers or at least research literate. There is clearly a need for deeper, theoretical orientation and ethical justification among many teachers than has been available to them for some time. So, in as much as the emergence of cognitive science prompts deeper thinking among

teachers about their work, we have few objections. However, there *are* some important points of objection to be made on philosophical, epistemological and ethical grounds.

In educational discourse, the influence of cognitive science often leads to a flawed premise where the mind is erroneously conflated with the brain (Rose, 2013; Tallis, 2011). The brain is a material phenomenon subject to constraints and affordances given by laws of nature. The mind is a social phenomenon, certain aspects of whose working are observable in the neural activity in the physical brain, but it is not reducible to the physical brain. One only has to consider the discrepancies in the historical development of our biological features with those of our cultural life to see that human consciousness is not synonymous with the brain. For example, our physical bodies have remained genetically more or less the same over the same period that our symbolic world has developed from myth and cave paintings to science and the art of T.S. Eliot and Picasso. The premise that the brain is the originating source of our actions also raises profound philosophical problems relating to free will and moral autonomy (which also have something to do with education).

A fact of nature is different from a social (or aesthetic) fact. Bourdieu (1992) argues that in contrast to a fact of nature, social facts require a sophisticated level of *prior* theorization to render them objects of academic study. Any empirical research of social phenomena, therefore, has to be undertaken *after* this essential stage of theorizing. If accepted (which we do), research (whether empirical or otherwise) is the *outcome* of critical thinking, not its source. None of this is to say that, in principle, education can, or should, have nothing to do with science whatsoever, but to point out that today's contextual specificities should prompt greater scepticism not only of the obvious targets of 'neuro-myths', which are widely debunked, but of the assumption that what is needed is *new* knowledge from *new* (i.e. scientific) sources. In response we would argue that a better understanding of existing educational scholarship is likely to be more constructive. Existing scholarship, however, cannot be recited like a mantra to ward off perceived evils; it needs to be re-contextualized in relation to the particular problems within education, and which face teachers today.

To accept the assumption that if teachers were more like researchers, or at least research literate, their confidence and public standing would be improved ignores a more fundamental subjective truth – no one's confidence and status are improved by pretending to be something they are not. To blur the boundaries between research and teaching, or

researchers and teachers, is likely to exacerbate existing problems in both spheres. What is desirable is a relationship, or better channels of communication, between the work of disciplinary academics, exam boards, education departments and, above all, subject teachers.

It is an intriguing thought that if more attention and effort were directed to improve our understanding about disciplinary knowledge, and its commitments to truth and freedom, we might be able to secure a wider, more robust consensus from which the profession might better (re)gain the social status it longs to achieve, and, in our view, deserves. And the idea of teachers being authoritative individuals might be grounded less in their personal psychology, their capacity as researchers or the extent of compliance with externally imposed codes and rules and more in their improved understanding of the nature of their work as well as the substantive content of their subject. Teacher education needs to help teachers become more knowledgeable in the substantive content of their subjects, their main disciplinary features, *and* the broader foundational subjects of education (history, sociology, philosophy and psychology), which have long since been diminished within teacher education (Lawes, 2004).

While established educational research has contributed, *inter alia*, to developing theories of learning and pupil motivation, to date it has not addressed the vital question of *what knowledge* should be selected for educational purposes. As long as the judgement concerning knowledge is deferred, which at the end of the day is as much a judgement of value as of epistemology, knowledge will continue to be supported rhetorically at best and disavowed at worst. We might improve our understanding of learning processes, exam rubrics might also be enhanced and exam performance might meet ever higher targets, but beyond understanding subjects as hoops necessary to jump through to gain access to a range of external goods, pupils, and maybe teachers, are likely to be left with a feeling of 'well, what's the point of that? Is that all there is?'

To conclude, we have argued that disciplinary knowledge, and its offspring, academic school subjects, represents the greatest cultural legacy from one generation to the next. Why would we want our education system to be based on anything less? We end with a quotation from De Tocqueville, 'When the past no longer illuminates the future, the spirit walks in darkness' (1835). If we cannot find better justifications for disciplinary knowledge and academic subjects, and if we do not make such knowledge manifest in our schools, we risk leaving the next generation technology-rich but intellectually, imaginatively and spiritually impoverished.

Note

1   The theoretical ideas, or conceptual tools, with which school knowledge can be more closely analysed and described in terms of the internal relations between different forms of knowledge, and between conceptual content and procedural principles, are provided in the work of Basil Bernstein, particularly in *Class, Codes and Control: Towards a theory of educational transmission vol. 3,* and in *Class, Codes and Control: The structuring of pedagogic discourse vol. 4* (1975 and 1990 respectively), and in his 'Vertical and horizontal discourse: An essay', *British Journal of Sociology of Education*, 20 (2), 157–73 (1999). For a consistently clear and helpful explication of Bernstein's theory, see Robert Moore's *Basil Bernstein: The thinker and the field* (2013).

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'This book brings profound questions about what children need to know back to the centre of educational enquiry where they belong. The additional chapters in this second edition are excellent. We all need to read it.' – **Professor Elizabeth Rata**, *University of Auckland*

The design of school curriculums involves deep thought about the nature of knowledge and its value to learners and society. It is a serious responsibility that raises a number of questions. What is knowledge for? What knowledge is important for children to learn? How do we decide what knowledge matters in each school subject? And how far should the knowledge we teach in school be related to academic disciplinary knowledge? These and many other questions are taken up in *What Should Schools Teach*?

The blurring of distinctions between pedagogy and curriculum, and between experience and knowledge, has served up a confusing message for teachers about the part that each plays in the education of children. Schools teach through subjects, but there is little consensus about what constitutes a subject and what they are for. This book aims to dispel confusion through a robust rationale for what schools should teach that offers key understanding to teachers of the relationship between knowledge (*what* to teach) and their own pedagogy (*how* to teach), and how both need to be informed by values of intellectual freedom and autonomy.

This second edition includes new chapters on Chemistry, Drama, Music and Religious Education, and an updated chapter on Biology. A revised introduction reflects on emerging discourse around decolonizing the curriculum, and on the relationship between the knowledge that children encounter at school and in their homes.

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