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Changing Texts

An international review of research on textbooks and related materials including a specific focus on Sweden

Research Report

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Specific Focus on Sweden

Please note for this section only, all references are included at the end of the section, to allow this part of the report to be printed off and used as a stand-alone paper

Introduction

This section is devoted to a focus on Sweden alone. It follows the same main structure of the main report 'Changing texts' but some categories have been combined:

1. Quality and anti-textbook ethos
2. Governance and textbook development
3. Patterns of use
4. Sociocultural analysis
5. Digital
6. Impact

A limitation of our analysis is that we have accessed the English language literature research for Sweden and recognise that there is a substantial body of Swedish-language research which we have not accessed. Nonetheless, much key work is available in English, and the majority of key Swedish language research is referred to as corroborative evidence for the analysis available in English. We hope that the frameworks and insights which we have brought to the area will stimulate further review and scrutiny of the domestic literature.

We note the reservations regarding the PISA data for Sweden in Sayers et al. (2019) and which may apply to Swedish students' motivational engagement in both PISA and TIMSS. However, unless the motivational effect for Sweden shows a consistent trend downwards (an effect for which there is no research and no international benchmark analyses), then the strong pattern of performance over time identified and analysed in both PISA and TIMSS results in the 2016 IVA Report (Henrekson & Jävervall, 2016) needs to be taken seriously in making judgements about Swedish educational arrangements. We note of course the 2011 to 2015 uplift in TIMSS results (not covered by the 2016 IVA report due to publication data), but also the general plateauing evident in the 2019 data (TIMSS, 2021).

When examining the history of textbook research, all summary literature reviews show that Europe and the USA have produced the highest volume of research studies on textbooks and allied materials (Foster, 2011; Rodriguez et al., 2019). To recognise this of course is not to understate the importance of research and action in other national settings, but it certainly is the case that in Europe, the Nordic countries have been highly productive, and have been responsible for diverse and penetrating studies, which have contributed significantly to both understanding and to the quality of textbooks. It is not an overstatement to say that Sweden has a solid and impressive 'tradition' of textbook research, now being carried forward into a world of paper and digital materials. Swedish research and action on textbooks has been pre-eminent in the Nordic space, but it is important to recognise the shifts and decline of textbook research over the past decade. Below, we try to establish reasons for this decline, which we see partly deriving from domestic factors, and partly from wider, general trends. We do note that there are some positive signs in Sweden: Parliamentary interest in textbooks and materials and their role in the system; the continued tradition of maths textbook research; early career scholars active in textbook research; collaborative research across the Nordic nations; and specialists and associations who continue to keep the issues alive (Svenska Läromedelsförfattarna; Förläggareföreningen; Lärarnas riksförbund).

Nordic textbook research as a whole is extremely comprehensive and wide-ranging, and is responding to the necessary focus on digital learning materials. It has showed the same tendency as global research on textbooks in focussing on cultural critique and a 'text analytic' and 'narrative' focus – there is less of the 'information element' and empirical analysis of impact which helps digital-paper comparison in particular. However, Swedish research covers vital areas of pedagogic models, curriculum coherence and patterns of use and impact. The extent to which textbooks affect pedagogic and didactic practice is well covered, and there is significant work on reform processes, and thus there is good coverage of the role of textbooks in 'curriculum coherence'. There are contributions on

important but neglected areas such as the affective states of teachers in using textbooks: not just their attitudes to textbooks, but the emotional states they possess when using textbooks (Pehkonen, 2004). There is, in line with trends globally, far less research on governance arrangements, and marked paucity of work on the structure of markets and sustainability of supply. The level of collaboration between researchers across the Nordic States traditionally has been high, and the 1980s and 1990s saw a significant expansion of Nordic textbook research. Johnsen details the paucity, prior to the 1980s, in Swedish educational research of study of textbooks and their role (Johnsen, 2001). He draws attention to a scattering of pivotal texts from the USA, Norway, and Denmark. But in the increase in depth and breadth of textbook research, Sweden occupies a distinctive place. Principal in this is the founding of IARTEM - the still-extant International Association of Research on Textbooks and Educational Media, linked to the previously high levels of formal recognition of textbook research in Higher Education in Sweden.

From its formation in 1991, IARTEM has become a key part of the field. But its own history reflects and is intimately tied up with the position of textbook research in Sweden.

IARTEM's origins lie in earlier collaborative work in Sweden, which grew to include other Nordic nations - indeed the organisation '...grew out of a vision to combine Nordic research on textbooks with an international focus...' (Knudsen & Selander, 2019, p. 23). It may have had a Nordic and international orientation, but it is important to recognise that it was founded in Sweden, and that it received collaborative support and endorsement from Swedish Higher Education through the founding of the Institut för pedagogisk textforskning in Mid Sweden University. Staffan Selander was central in this founding activity, initially in the 1980s, galvanising Swedish researchers in textbook research and starting - with support from two Swedish universities (Stockholm and Mid-Sweden University (Härnosand) the 'Spov' periodical. Selander's 1988 seminal piece 'Textbook Knowledge' (Läroboksskunskap) influenced both researchers and authors - '...Selander already had proved that a form of literature as modest as that of schoolbooks was also fully worthy of thorough studies…' (Johnsen, 2001, p. 15).

IARTEM was founded in Sweden and formed a focussed hub of intellectual and practical activity, strengthening Nordic collaborative networks. But things have changed. An initial move of the locus of control of IARTEM has moved to a fully global focus, and with an administrative centre to Paris accompanied a drive to a more global and multi-cultural orientation. Moving in 2004 to Kongsberg, Norway, in the premises of The University of South-Eastern Norway (Department of Languages and Literature Studies), this global orientation remains clear in the breadth of topics and nations represented in IARTEM publications and conferencing. But with no board members from Sweden, IARTEM no longer signals Sweden's previous status as a hub of textbook research. Meanwhile, the centre for textbook research has declined in the Swedish Central University, and whilst research dissertations and other work on textbooks in Sweden appear to be at a level higher than the majority of European universities, no longer is there a key 'hub' of research on textbooks and allied materials as there is in Denmark at UCL Odense, or Germany at the Georg Eckert Institute. The movement of the centre of gravity of IARTEM from Sweden, the decay of the centre at Mid-Sweden University, and the 'homelessness' of textbook research is striking, witness Stefan Selander's account of the shifting 'home' of his work on textbooks – from Mitthögskolan to Vestfold/Tonsberg and then Växjö.

This history matters. In our framework for the understanding of the operation and improvement of educational systems (Cambridge Assessment, 2017), we place textbooks and learning materials as key elements of curation and promotion of core curriculum content, as well as having essential impact on pedagogy and didactics. We make the key point that while they can carry fundamental functions in respect of Schmidt's ideas of 'curriculum control', if in a given nation they are not used as instruments of policy, then the functions need either to be carried by other elements of arrangements - or the foregone in the system. This is a very serious issue for quality and equity.

It therefore perhaps is surprising that it does appear that the role of textbooks and learning was neglected in the structural reforms of the education system which occurred in Sweden in the 1990s: reforms which coincided with the 'silent' withdrawal of state approval of textbooks (Johnsson Harrie, 2009). Or perhaps it is not surprising at all - since the reforms had a very high level of explicit and implicit confidence in the way in which the impact of market reform would permeate the system - an

‘invisible hand’ acting in all aspects of quality and provision (Björklund et al., 2005; Henrekson & Jävervall, 2016). And, as the reforms indeed began to become highly pervasive and genuinely structural, the general set of market and governance arrangements has meant that Sweden has not maintained the prominent position in textbook research which it previously had.

In the light of these shifts and changes, the research-policy-practice linkage thus is relatively weak. However, Sweden remains relatively strong in capacity, and there are promising emerging developments. We feel that:

1. there is a rich heritage
2. researchers are active
3. organisation for curriculum coherence is emerging

We explore these further in the Governance segment below.

1
Quality and anti-textbook ethos

Our wider analysis of the performance of education arrangements in different nations includes consideration of the function and impact of different models of restriction (regulation), intervention and support (Cambridge Assessment, 2017). ‘Restriction’ and ‘regulation’ have become highly politicised (Belfrage & Kallifatides, 2018; Haines, 2009) and in Sweden debate remains extremely vigorous in respect of the precise boundaries of State action and responsibilities in education (Sahlgren, 2016; Wennström, 2020). OECD in 1992 stated the assumptions within the shifts in the locus of control: that the equity and attainment in education supported by previous central restriction in education would readily be delivered by greater localisation combined with rational action by society (OECD, 1992). Within this overall shift of paradigm in education policy, this review engages with the specifics of restriction in respect of learning materials.

In our transnational analysis of the structure of markets in learning materials, including in the context of fully privatised supply, we argue that the State can continue to have a viable and important role in (i) maintaining an overview of the features and assets of high quality materials; (ii) stimulating demand for high quality materials, not least through signalling quality; (iii) ensuring that adequate funding is available for the purchase of high quality materials (feeding into sustainable supply). Our analysis of markets for both paper and digital materials highlights the problem of the lack of clear signalling of quality, and thus the imperfection in market structure. ‘Co-ordinating layer’ organisations signal quality and contribute to the attainment of ‘curriculum coherence’; continuity in aims, content, methods, instructional materials etc. Inspection services and government agencies at different times, in different nations, can play a vital part in signalling quality, and operate as a ‘Co-ordinating layer’.

For the Swedish context, and for learning materials, we believe it is important to have visibility of the forms and means of restriction which have been applied to learning materials. The Swedish school inspectors engagement with textbook choice in the lead up to legally-grounded national approval in 1938 signalled State interests in quality, and our summary of Anna Johnsson-Harrie’s study of the period of approval 1938-1991 for civics textbooks emphasised the focus on factual errors and a surprisingly low focus on curriculum alignment (Johnsson Harrie, 2009).

Although the balance of focus varied over time, the 1938-1991 processes matured around four key summary areas: (1) the price of the book; (2) the alignment of the content with the requirements of the national curriculum (curriculum coherence); (3) factual accuracy (objectivity); (4) language and design, and their pedagogical import. The focus on curriculum coherence and support of effective pedagogy is crucial - and Reichenberg argues that this highlights that ‘…the State was driven by a different logic than the market and thus had a different agenda’ (M. Reichenberg, 2014, p. 72).

Within this, Hultén's work on the emergence of science textbooks notes the importance paid to the impact of the textbooks on pedagogy and not merely the organisation of scientific knowledge (Hultén, 2016).

The final phase of approval (up to the cessation of approval in 1991) is marked by a concern over factual content and 'representation and accessibility' – a move which is also marked in the general body of textbook research in Sweden (see segment 2 on Governance and Textbook Development).

Johnssen-Harrie's historical analysis posits five phases (Johnsson Harrie, 2009):

- Pre-1938: an absence of apparatus dedicated to review and/or approval of textbooks - although the Swedish school inspection arrangements did include engagement with the quality and use of textbooks (which we explore below).

- 1938-1974: under the Swedish Textbook Board (reorganised in 1948) reviewers were appointed to undertake compulsory, central review which could apply to all/any textbook, examining price, curriculum fidelity, scope and approach, age-appropriateness, and the objectivity/validity of content.

- 1974-1983: reviews which were completed by appointed reviewers, with approval decisions being made by the National Board of Teaching Aids, part of the National Board of Education (SO). A framework-based review process, focussing particularly on materials in social sciences, civics and humanities, with a strong emphasis on 'objectivity' and curriculum alignment, including curriculum aims and values.

- 1983-1991: under the Teaching Aids Board, as part of The National Institute for Teaching Aids Information (SIL), a move from approval (and rejection) to statements on quality - a reduction in restriction. A continued framework-based review process, continuing to focus on social sciences, civics and humanities resources.

- After 1991: reviewing ceased with the dissolution of SÖ (Skolöverstyrelsen) and SIL. The National Agency for Education (Skolverket) has the powers to carry out reviews, with only one to note: a 2006 review of textbooks in biology/science, history, religion and social studies grades 7-9 and upper secondary.

These processes cross over with the engagement of the Swedish inspection arrangements with textbook quality. We recognise that the inspection service went through various transformations during its first 130 years of existence, after its formation in 1861, including the formation of Skolöverstyrelsen (SÖ) in 1918 and the later shifts between regional and state co-ordination of inspection. Linda Rönnberg (2014) traces the important changes which occurred in the 1980s and 1990s, principally the dissolution of the SÖ and formation of the National Agency for Education (NAE - Skolverket), and the reconstitution of inspection in a reformed NAE in 2003 - and finally, the formation of the Swedish Inspectorate (SI) in 2008. What is significant for our review is the protracted - although intermittent - engagement of the 'inspection layer' with issues of the quality and use of textbooks. It is important to view this structurally: just as the dissolution of inspection in Sweden highlighted its importance in arrangements, leading to its swift 're-invention', the engagement of this crucial institution in issues of textbook quality is indicative of the importance of textbooks and educational resources in the enactment of high quality educational provision - the powerful 'steering function' referred to in Finnish educational tradition (Viholainen et al., 2015).

For a system driven by autonomy, there is a low level of research on teacher choice in materials (both paper and digital) – with Reichenberg and Andreassen being a stand-out exception (M. Reichenberg & Andreassen, 2017). Our own interviews in Sweden found a growing interest in teachers' editing and reconstructing of digital materials (see Section 12 on Paper vs Digital) but scant research on the patterns of selection, the quality, patterns and practices of formation of materials, and the workload issues associated with this form of creation. We note Staffan Selander's move from his original work on elaborating the research on textbooks and into a re-framing of the relationship between pupils and

learning resources (Kress & Selander, 2012), where collaborative design processes become possible for both learning and learning materials.

With proliferation of digital materials, we note the emergence of Sweden EdTest and EdTEchLnu, which emphasise evidence-based support both to developers and teachers - a very necessary development (European EdTech Network, 2021), albeit in its infancy. This places a very strong emphasis on pedagogic and didactic quality, and developing systematic relations between teachers and developers – and, as we state above, does emphasise the neglected link into initial teacher training. A word of caution is necessary, since this 'co-ordination layer' itself holds the possibility of being occupied with multiple voices and players (Business Finland, 2021; Iotkovska, 2021), something we explore in the Governance segment of this section (2 below).

Marsden (2001) noted in England the emergence in teacher training of a strong 'anti-textbook ethos' and we explore this in the main report in considerable detail, criticising commentary and research which lapses into a reductive discourse of 'false oppositions' – between knowledge and skill, pedagogy and didactics. The recent Swedish Government Enquiry into learning materials in its scrutiny of the views of educators detected contemporary 'anti-textbook ethos' in teacher educators (Swedish Government Official Reports (SOU), 2021). In our international work on 'anti-textbook ethos', we find much of the debate drive by outmoded philosophical positions regarding the status of knowledge (Bhaskar, 1975; Green, 1997; Young et al., 2014). We also noted across nations a tendency for advocates of new curricula and new learning materials to promote new agendas and materials by falsely characterising paper-based textbooks as inflexible and 'of the old order'. For Sweden, we note that research on 'digital in education' does tend to focus on 'personalisation' as an unproblematic requirement for future learning and an unalloyed 'good' (Bunting et al., 2021; European Parliament, 2020; Hillman et al., 2020; OECD, 2009; Rensfeldt, 2012). This is beginning to assume the form of an 'anti-textbook' positioning. We explore this further, and its limitations, in the segment on digital in this section.

We note that there does appear to be a contrast between the nation as traditionally a high frequency user of textbooks (OECD, 2014) and the new models of learning being proposed both in teacher training around teaching and learning materials and the latest tranche of digital resources (Kempe & Grönlund, 2019; Kress & Selander, 2012). We will mark this as 'continued contestation regarding quality of education' and remain concerned that fractures are opening between teacher practice, assumptions in research, and rhetoric associated with digital learning resources. This suggests that policy makers and teachers will find it increasingly difficult to navigate the selection and use of learning materials, and the rapidly expanding groups of materials developers will find it difficult to negotiate the body of evidence on learning models and quality.

2
Governance and textbook development

We noted in the introduction that Sweden remains relatively strong in capacity, and there are promising emerging developments. We feel that:

1. there is a rich heritage
2. researchers are active
3. organisation for curriculum coherence is emerging

1 rich heritage
The long Nordic tradition of using textbooks as a structural element of national education means that there is accumulated knowledge of many dimensions of textbooks design, production and use. The national approval processes of the 30's through to the 90's established wide understanding of the form and function of textbooks, with a strong focus on curriculum coherence and pedagogy/didactics. This rich heritage in thinking and action should not be regarded as 'past history, now gone'; it offers deep insights into what is possible in public policy, how schools and society can harness the benefits of high-quality resources, and what should be considered in action on quality and use.

2 active researchers
Although the Swedish and Nordic 'centre of gravity' of IARTEM has shifted, and there no longer is a designated centre for textbook and learning materials research, there are active researchers of all ages and career stages, and publication continues in high quality reviewed journals. Papers and publications range widely across the field, which is a strength.

3 organisation for curriculum coherence
The State's interest in curriculum coherence can been seen in the inspectors' concerns for textbook quality and use well before State approval processes were introduced in the 1930's. While the repeal of approval in the 1990s occurred quietly and with little public scrutiny, there are signs of increasing concern regarding quality and effective use of textbooks and materials. For the last two decades there appears to have been high reliance on liberal theory of 'market provision' - including notions of quality improvement through market pressures. There is scant evidence that the market has functioned as intended. The drive to quality thus is not 'self organising'. We note the Swedish School Inspectorate's interest in textbook quality, albeit this interest being only very occasional and limited to some segments of the market and some characteristics of materials. Crucially, spend on textbooks and related materials is highly variable across schools – an average of 65euro per pupil masks very high variation between localities: from 14euro/pa to 260euro/pa. Expenditure on textbooks and materials has reduced significantly as a proportion of per pupil cost/spend (Läromedelsföretagen, 2021; Läromedelsförfattarna, n.d.).

Yet municipality interest in sustainable supply and effective use of high-quality materials seems to be growing. The emergence of Sweden EdTest and EdTEchLnu, which emphasise evidence-based support both to developers and teachers, is driving hard on quality. Swedish publishers' and authors' associations also have expressed increased interest in issues of quality, supply, choice and use. These developments represent institutional (organised) action on quality, supply, choice and use. EdTest and EdTEchLnu work on stimulating teachers' knowledge regarding choice and use have been supported by European Commission initiative. This all corroborates Schmidt and Prawat's (2006) contention that curriculum control can be enacted through various forms of organisation, not only through direct State action. In the discussions around enhancing quality in textbooks, there are often assumptions that if the market is not functioning to deliver quality, then the only means of effecting 'curriculum coherence' is through state approval. But the Swedish State's previous direct actions, from 1938, on textbooks and learning materials, through school inspection and textbook approval processes, are not the only form of action which can be taken; the new forms of institutionalised interest in quality, supply, choice and use, which we note above are important initiatives - though as yet not proven.

We highlight in this review the complexity of both the form and function of textbooks (Section 12). This complexity has considerable consequences. Design is a multifaceted process. So too is government specification of requirement. If textbooks are not state-approved, then it may be the case that these functions are attended to carefully by all producers. But the imperfection of markets (see Section 7 on Governance) means that in almost all cases the complexity gives rise to very significant variation in products and variation in their availability – and in digital materials a startling array of such variation. Markets function through various dimensions of variation and choice – and it is important to note the structure of markets in restrictive arrangements such as those in Singapore and Hong Kong allow certain forms of variation. In those settings, a broad set of principles and specific criteria are in operation. These sanction variations which afford school and parental choice in materials – a single process of approval operates, but multiple providers and permissible variation on some design dimensions allows provision by a number of competing providers.

As we outline in Section 7, market failure can particularly manifest itself through problems in pricing, supply, and quality. Small adjustments and minor restriction/regulation or producer-consumer self-organisation can improve market structures and market behaviour (Halpern, 2015) even. In saturated and complex markets with complex products – and we would argue that both textbooks and digital learning resources fall into this category - if quality is not signalled in any clear way - by the state, by associations, by common culture - then teachers and schools solely are responsible for an extremely demanding decision. The asymmetries in market knowledge are, we feel, strongly linked to this complexity - and we explore this in section 7. State approval operated in Sweden until the 1990s. Anna Johnsson-Harrie's study of approval 1938-1991 of approval of civics textbooks traces not only

the way in which approval operated and its potency - its focus on factual errors, a surprisingly low focus on curriculum alignment - but on the extent that social and political consensus operated to endorse the State's role in approving materials (Johnsson Harrie, 2009).

While modern theory and research has elaborated the functions of textbooks and related materials, the 1938-1991 processes matured around four key summary areas: (1) the price of the book; (2) the alignment of the content with the requirements of the national curriculum (curriculum coherence); (3) factual accuracy (objectivity); (4) language and design, and their pedagogical import. The focus on curriculum coherence and support of effective pedagogy is crucial - and Reichenberg argues that this highlights that '...the State was driven by a different logic than the market and thus had a different agenda' (M. Reichenberg, 2014, p. 72).

Hultén notes the importance attached to the emergence of State approval of science textbooks in the 1930s - and the influence they exerted on pedagogy and not merely the organisation of scientific knowledge (Hultén, 2016). Significantly, he also notes that for many decades prior to the 1930s, school inspectors' views of high-quality texts played a role in text selection prior to the advent of State approval, and that competition arranged by Parliament had a role in signalling quality. Karnfelt joins with Hultén in arguing that even before this, in the late 1800s, State directives, combining with scientific professionalisation of the teaching force were impacting on the form and content of textbooks: '...unfortunately you have to conclude that if these directives made textbooks more trustworthy, more scientific, it also means meant that they lost all of their charm...' (Karnfelt cited in Hultén, 2016, p. 24).

We have noted elsewhere the removal of State approval in Finland in the early '90s, but scrutiny of comparative analyses across Nordic nations (e.g. M. Reichenberg & Andreassen, 2017) suggests that the 1990s saw a common move away from state approval processes:

> *...the deregulation was not a specific Nordic phenomena but part of the neoliberal policy shift that occurred during the late 1990s and later...several other nations also deregulated, including Australia, Denmark, England, Estonia, Finland, Ireland, Italy and the Netherlands...* (M. Reichenberg & Andreassen, 2017, p. 8).

Our section on the 'Anti-Textbook ethos' (Section 6) outlines the impact of shifts in broader educational theory as influencing the practical development of materials and practice of teachers, and Reichenberg and Andreassen link the widespread deregulation to emerging orthodoxy:

> *...by giving teachers increased influence on the selection of textbooks and other curriculum materials, policy makers thought that teachers were able to make use of and share their pedagogical content area knowledge and pedagogical methods concerning textbooks and other curricular materials. Such knowledge sharing would ultimately lead to more creative instruction and an instructional policy that was better suited to handling the increased diversity of students...* (Reichenberg & Andreassen loc cit).

Framed in this way, it can be seen that a major shift in educational policy - moving from textbook approval as a major instrument for 'curriculum, coherence' - was effected on the basis of a hypothesis: that removal of approval would result in educational improvement, particularly in equity.

For Finland, Josephine Moate is ambivalent about the benefits of the embedded, enculturated skills of teachers and pupils in using high quality textbooks systematically - she argues that while this may traditionally have improved both attainment and equity in Finland, it may contribute to the equity gap between Finnish pupils and immigrant pupils (Moate, 2021). But she remains ambivalent about whether the realisation that immigrant pupils lack the implicitly-acquired skills and attitudes which underpins effective engagement with textbooks should result in an attempt to enable them to acquire such skills, or whether the culture of textbook use itself should be changed. In her eyes, in 2021, it remains a policy dilemma as to which way to go.

With long-term declines in performance in Finland and Sweden (Henrekson & Jävervall, 2016; OECD, 2019), and this decline coinciding with decreasing focus on 'curriculum coherence' and 'curriculum control', it could be argued that the hypothesis around liberalisation and delegation of materials choice

to teachers and schools has been to a degree tested and found wanting. As we have stated elsewhere in this report, the recent improvement in Sweden's PISA results (2015 and 2018) coincides with fine tuning of municipal and state elements of 'curriculum control' in the decade preceding 2015, principally focussed on sustaining school inspection and requiring school participation in national testing, both of these measures increasing 'signalling' of performance at school level (Sahlgren, 2016). Textbooks and learning materials – once a principal focus of restriction and regulation, have not featured significantly in this fine-tuning. Again (as in Section 7), we should emphasise that although 'curriculum coherence' has frequently been affected through the 'curriculum control' offered by State approval of textbooks, 'curriculum coherence' could be attained by other approaches which focus on and promote high quality and effective patterns of use.

For Sweden, Anna Johnsson-Harrie suggests that the move in 1991 from formal State approval - a fundamental change in educational arrangements - was not extensively discussed in the political and public spheres:

> *...in the 1930s there was a political consensus to have an official approval scheme. In the 1990s the approval scheme was repealed without any political debate...* (Johnsson Harrie, 2009, p. 1).

Moate's analysis of Finland emphasises that the skilled, highly consistent and highly specific use of textbooks is implicit in Finnish teach training and professional practice, and barely features as an explicit element of training (Moate, 2021). We found no research on the way in which Swedish teachers are prepared in the selection and use of textbooks and related materials, although Reichenberg's analysis examines the pattern of teachers' practices in selecting texts (M. Reichenberg, 2014). She argues that this is 'a neglected area' - and we would corroborate this. Her key study of 319 teachers reproduced our own findings in Finland: that the emphasis on content of textbooks and discussions in the professional community 'safeguarded the old criteria from before 1992...' (M. Reichenberg, 2014, p. 86), and that there was a surprisingly low level of influence of publisher marketing and commercial activity at book fairs. She also noted the decline in content based decision-making, and the increase in habit-based decisions as teachers grew in experience.

It is vital to note that the study was based on paper-based materials and the findings may have shifted considerably with the increased use of digital materials, not least in the face of the proliferation of digital resources. The paucity of research on teacher choice of textbooks in Sweden is matched by a low level of research on selection of digital materials. However, we note the emergence of Sweden EdTest and EdTEchLnu, which emphasise evidence-based support both to developers and teachers - a very necessary development (European EdTech Network, 2021), albeit in its infancy. This places a very strong emphasis on pedagogic and didactic quality, and developing systematic relations between teachers and developers - and does emphasise the neglected link into initial teacher training. We characterise this as an 'organising layer' in the system – a role which formerly was taken by the State in the operation of school inspection (which continues) and then formal approval (1938-1991). But we also note the appearance of various/competing 'organising layer' developments – self-organisation by industry and interest by municipalities and the possibility of multiple, potentially conflicting actors within this emerging layer.

3
Patterns of use

Beyond quality of content, structure and availability of learning materials, understanding how textbooks are used in practice is a crucial line of research that has seen some development in Nordic textbook studies. In our main report, we noted the existence of a research gap in understanding how textbooks are used or 'implemented' by teachers in the classroom, and an even more stark research gap in understanding how pupils use textbooks (see Section 9 on Patterns of Use). This segment describes and assesses how research on textbook use in Nordic countries has developed in particular directions, and identifies the specific contributions of Nordic research to theory development in this area. We discern among these studies several applications of innovative research methods to generate new data and insights into textbook use, but note that there is still much more potential for further exploratory research on this topic.

Teachers' and students' use of textbooks

Understanding how textbooks are used in the classroom requires exploring how factors such as teacher training, and cultural context, can shape a textbook's implementation. Both teachers and pupils are textbook users, and Lepik et al. (2015) observed that while much has been written about the work of teaching, little effort has been devoted to examining teachers' textbook use. In recent years, there has been a concerted effort among Nordic researchers to address this research gap, particularly so in the area of mathematics. This is perhaps unsurprising given the strong tradition of mathematics education research in Nordic countries. Finally, we note that Nordic research has also helped to develop typologies of 'profiles' of teachers and their use of textbooks.

- *Teachers' use of textbooks: Mathematics education*

Mathematics education research in Sweden has a tradition of examining textbooks as implemented curriculum firstly by examining the structure and representation of topics in maths textbooks, and secondly by drawing out assumptions about knowledge acquisition through the analysis of tasks in textbooks (for a comprehensive overview, see Jablonka & Johansson, 2010). Yet even in the relatively dynamic area of Swedish mathematics education research, textbook use in classrooms has been a somewhat 'untapped area of research' (Jablonka and Johansson, 2010, p. 370). We perceive that this dynamic may be shifting in recent years, with promising research ongoing on teachers' use of curriculum material in classrooms at Swedish research institutions such as Mälardalen University.[1]

Maths is a subject where teachers often use textbooks extensively in their teaching practice (Robitaille & Travers, 1992; Valverde et al., 2002). Nonetheless, there are important variations between Nordic countries in terms of attitudes towards textbooks, the extent to which teachers in different countries depend on them as a tool in teaching, and methods of using textbooks in instruction. These differences can be highly nuanced. For example, although Pepin, Gueudet and Trouche's (2013) study showed that the Norwegian mathematics teacher was heavily dependent on textbooks (p. 693), Lepik et al.'s (2015), research found that maths teachers in Norway used textbooks in a more limited way than teachers in their two other case studies (Finland and Estonia), and primarily as an exercise book. In the Swedish context, studies have shown how maths teachers favour 'speed individualisation' strategies – students are allowed to work with the textbook at their own pace, and given tasks to complete according to individual instructions (Hemmi et al., 2019; Johansson, 2003). This contrasts with teachers' approaches to maths textbooks in Finland, where a whole-of-class approach is often taken. Speed individualisation in Swedish maths education is also indicative of a wider trend away from collective to individualised teaching in Swedish classrooms since the 1970s. This is whereby Swedish students today seem to spend more time working individually in the classroom than their Nordic counterparts, and Swedish teachers spend more time in one-to-one interactions with students than teaching collectively (O. Reichenberg, 2017). School agencies and the Swedish government have made attempts to steer teachers away from traditional speed individualisation strategies through a national core curriculum and other initiatives, with some success: there are indications that maths teachers in Sweden are interested both in varying their methods and in applying Finnish curriculum materials in Swedish schools (Hemmi et al., 2019, p. 343).

Neuman et al. (2015) conducted research that showed how teachers' use of textbooks may vary in response to the specific textbook and the characteristics of the support material. Analysing the responses of 278 teachers in Sweden to a questionnaire, the authors found important differences in teachers' perceptions of the support received from curriculum material on topics such as how to vary and concretise instruction. Their comparison of teachers' perceptions of two prominent maths textbooks – *Eldorado* and *Matte Direkt* – revealed that teachers using *Eldorado* generally perceived the accompanying teacher guide to be a useful resource, and were more likely to adopt a varied

[1] See for example 'Theorizing teacher use of curriculum material within mathematics classroom practice', a project funded by the Swedish Research Council (2015-2021) (Mälardalen University, 2021).

teaching approach. Teachers using *Matte Direkt* were less satisfied with the material, and more likely to use instructional time on letting students work individually with their textbooks.

- *Teachers' use of textbooks: profiles*

Qualitative studies on textbook use by Finnish maths teachers have made some important contributions (see Pehkonen, 2004, 2007), while the Nordic project on curriculum materials in mathematics education constitutes a significant project exploring how compulsory school teachers relate to curriculum materials in maths education. This has led to recent collaborative work across Nordic universities such as by Pehkonen et al. (Pehkonen, Hemmi, et al., 2018; Pehkonen, Piht, et al., 2018) on establishing teacher 'profiles' and 'orientations' towards curriculum materials in Finland, Sweden and Estonia in maths education. In their comparison of teachers' perspectives in Finland and Sweden, the authors observed key differences in attitudes towards learning materials between experienced and inexperienced teachers (Pehkonen, Hemmi, et al., 2018). More experienced teachers demonstrated a greater capacity to customise textbooks for their purposes, and were less likely to perceive the use of textbooks in instruction as burdensome.

The development of teacher profiles by Nordic researchers in relation to practices around the use of textbooks and learning materials has seen more general development outside of research on mathematics education. In Denmark, a tradition of qualitative study of textbook pedagogy can be discerned where research has focused on teachers' agency and interpretation of the curriculum and learning materials as significant mediating factors. This has led to the development of a typology of teachers that categorises teachers according to their approach to textbook use (ranging from the autonomous to the dependent user of textbooks) (Hansen, 2018). As Hansen (2018) notes, understanding teacher 'user' profiles means eventually complementing these qualitative studies with quantitative research on the prevalence of these types of profiles, while similar research that is more explicitly focused on pupil user profiles would enable a similar understanding of the ways students use textbooks (p. 373).

- *Students' use of textbooks*

Students' use of textbooks remains a comparatively under-explored theme – with some exception, as seen in the following studies. Maagero and Skjelbred (2010; cited in Hansen, 2018) used a 'think aloud' method to explore Norwegian students' perceptions of materials that they are expected to interpret in a classroom, such as texts, images and diagrams in a textbook. The authors used this method to identify students' perceptions of difficulties and challenges in relation to the textbook material they were exposed to: for example, they found that students struggled with making inferences from diagrams in maths and the natural sciences, where the condensed information proved difficult for students to unpack. Boesen et al. (2014) examined mathematics teaching practices in Sweden whereby the authors conducted 201 lesson observations in Swedish schools. They noted that the textbook functioned as a key resource: students spent a substantial amount of time solving tasks individually or in small groups (approximately 60% of the time), with the vast majority of tasks taken from textbooks, and occasionally from handouts provided by their teachers (Boesen et al., 2014, p. 81). Moate (2021) adopted a historical analytical lens on Finnish education to argue that the significant presence of textbooks has long been a strong cultural feature of the Finnish system, whereby children are carefully introduced to textbooks (and how to use and navigate them) from an early age. Student teachers are also 'apprenticed' into the use of textbooks in teacher training (Moate, 2021, p. 358). Understanding how textbooks are used in the classroom by pupils in Nordic countries would benefit from further empirical or analytical studies.

Benefits of mixed methods research

Hansen's recent assessment of the state of research on textbook use emphasised the need to 'approach the use of textbooks as polysemantic artefacts in complex contexts' (Hansen 2018, p. 375). In particular, his concern was that quantitative studies on textbook use are often not explicitly underpinned by a theoretical approach; qualitative studies, while they have featured more explicit theoretical underpinning, often struggle to break away from a text analytic tradition. This highlights the

potential for more exploratory, innovative research on textbook use, and the value of studies that generate data on textbook-user interaction patterns as well as the processes of these interactions.

There has been some recognition of the strength of applying mixed methods research among Nordic researchers, and the notion that mixed methods research can contribute different aspects to textbook use. This has been notable in Denmark, where new studies show an increasing inclination towards using mixed methods in combining textbook content analysis, document analysis of teachers' planning documents, interviews, observations, and ratings of textbooks by students and teachers. This has produced quasi-experimental studies in mathematics, and findings that teachers are combining traditional modes of teaching in their approaches to using innovative textbooks in mathematics (Hansen et al., 2015).

Similarly, Olof Reichenberg's study (2015) applied a mixed methods approach to describe and explain variation in use of instructional materials (laptops, textbooks, paper-based materials and whiteboards) through video recording 74 lessons in Swedish schools. Reichenberg's study delved into Swedish policymakers' assumptions that increased access to computers in the classroom would lead teachers to make use of computers to a much greater degree, and at the expense of traditional print learning materials. His research explored why this expectation was not realised, and illustrates the importance of understanding complex contexts around teachers' decision-making and agency in textbook use. He found that different instructional materials were associated with different forms of teaching practices, and that subject area and class size also predicted teachers' use of instructional materials. Social studies teachers were more inclined than language and maths/science teachers to adopt a traditional teacher centred practice using the textbook and whiteboard. He attributed this to a greater tendency among social studies teachers to exert more control over the pacing and selection of materials. Reichenberg's study adds support to other studies that have noted that Swedish teachers make use of print materials more than other instructional materials. Reichenberg concluded that a key factor was teachers perceiving computer usage in the classroom to be associated with a student-centred form of learning, where teachers have less control, and where there are more opportunities for distraction when compared with traditional paper-based materials.

Reflections

In this section, we have highlighted the key contributions that Nordic research has made to understanding textbook use in the classroom. Firstly, it is evident that a particular emphasis emerges in this body of research on the role of textbooks in mathematics education: a reflection of the collaboration among maths researchers facilitated by the Nordic Society for Research in Mathematics Education (NoRME) that has been active since 2008. In comparison, a far smaller number of studies have examined textbook use in other subjects. Much of this development in understanding use of textbooks in the classroom has focused on teachers. However, in comparison, students' approaches to using textbooks in the classroom remains an under-researched area: this is the case in the Nordic context but is reflected more generally as a gap in the literature in other countries and regions. Finally, we note the positive contributions Nordic research has made in initiating important discussions on the benefits of applying mixed methods research methods to further our understanding of textbook use in the classroom, and to deliver potentially novel theoretical and empirical insights.

4
Sociocultural representation and analysis

Sociocultural analysis of textbook content has formed a substantial portion of the literature on textbook research in Sweden. This reflects the significant role that Nordic countries have traditionally played in textbook revision (see Foster, 2011). Critical studies of Swedish textbooks and other learning materials have fostered an environment where the matter of textbook quality is dealt with seriously: whether textbooks in Sweden indeed reflect the intended curriculum, and promote equal access to knowledge and the curriculum among different groups of pupils. In this section, we examine several distinct areas of sociocultural analysis of textbook content that have emerged in Sweden:

representations of gender, minority religions, and indigenous Sámi in textbooks; and nation-building narratives within Swedish textbooks.

Gender

Promoting gender equality has formed a key consideration in Swedish education policy, where this is reflected in Swedish curricula and syllabi. It is for example clearly stated that awareness of gender equality should be reflected in every aspect of Swedish schools, as this section of the Swedish curriculum of 2006 indicates:

> *…Education can never be the same for all. The school should actively and consciously further equal rights and opportunities for men and women (…) The school has a responsibility to counteract traditional gender roles and should therefore provide pupils with the opportunity of developing their own abilities and interests irrespective of their sexual identity.* (Swedish National Agency for Education, 2006a, pp. 4–5)

Similarly, the Gender Toolbox produced by the Swedish International Development Cooperation Agency (SIDA) strongly advocates for gender equality in education, and specifies that textbooks, classroom materials and lesson plans should be 'gender sensitive in order to ensure their quality and relevance to the lives of all children' (SIDA, 2017, p. 3).

To what extent have there been issues and concerns raised about gender bias in Swedish textbooks? On this topic, the work of Blumberg, Gertzell and Knudsen have provided key insights into gendered language and representations in textbooks in Sweden, and in revealing instances of gender bias in Swedish textbooks.

Knudsen's examination in 2005 of humanities textbooks in Sweden concluded that there was very limited representation of female authors, artists or historical figures and advocates in Swedish textbooks. It is worth noting that Swedish textbooks were not unique in this regard, as quantitative and qualitative analyses of Norwegian textbooks showed that representations of men largely dominated in many textbooks produced for primary and secondary school students. However, Knudsen contrasted this to Central/South Eastern European countries and the Baltic region of the same time period:

> *In the so-called Western countries – i.e. Europe and the USA – gender perspectives in textbooks and textbook research are rarely reflected upon and depend on relatively fragmented and autonomous environments. In the Baltic countries, the former Soviet Union, and the Central and South Eastern Europe there has been some awareness of gender matters in textbooks and textbook research* (…) (Knudsen, 2005, p. 71)

Jonas Gertzell's essay written in 2014 examined and compared the gendered use of language in English as a foreign language (EFL) textbooks used in Swedish upper-secondary schools. Gertzell set out to establish whether the focus on gender equality – pervasive in policy documents and Swedish curricula since the 2000s – was reflected in EFL textbooks. Gertzell used discourse analysis to analyse characters' speech in three different textbooks, and subsequently characterised these according to linguistic features considered to be stereotypes of male and female speech. He concluded that there were indications of gender stereotypes in the language used. However, his study noted many instances where characters did not use gender stereotypical language and even where the 'opposite tendency is manifest, as some typically female features were used more by men and vice versa' (p. 20).

Blumberg's 2008 study compared gender representation in textbooks in multiple countries, concluding there was a 'near universality' to gender bias in textbooks around the world. His case study analysis found that textbooks in Syria, India, Romania, China and the United States under-represented women, and collectively reproduced a system of gender stratification and gendered role ascription. However, in Blumberg's analysis, Swedish textbooks stood out as an exception to this pattern, which he attributed to increasing efforts in Nordic countries over the last decades to address gender bias in

learning materials. Yet Blumberg also concluded that Sweden's efforts to remediate gender bias in learning materials could be described as overly thorough, with Swedish textbooks depicting a gender-egalitarian everyday life in Sweden, despite national statistics revealing a different reality of gender segregation in the Swedish education system and labour force (Blumberg, 2008, p. 354).

As such, several studies have examined gender bias in Swedish textbooks and have found generally far fewer examples of gender stereotyping when compared to textbooks produced in other countries. This is largely due to the concerted effort to address gender bias in learning materials and the education system as a whole, and reflects a close alignment with Sweden's curriculum and education policy aims. However, the above studies highlight that while Sweden has made remarkable progress in this area, there may be remnants of gendered language use and stereotyping in learning materials. Up to date empirical analysis of textbooks used in classrooms in Sweden today would give further valuable insight into the current state of gender bias and gendered language within learning materials.

Representations of minority groups

- **Christianity and minority religions**

How are different religions presented in Swedish textbooks?

Sociocultural textbook research in Sweden has been critical of a tendency to present non-Christian religions as 'other' within learning materials.

The scrutiny of textbooks in Sweden and the representation of Islam within textbooks formed the subject of a few critical studies, such as Härenstam's doctoral thesis on this topic (1993) and Sander's work (1988).[2] Härenstam's analysis was longitudinal, and noted a shift in the way newer textbooks presented aspects of Islam. For instance, jihad initially appeared in textbooks as a spiritual practice and physical discipline, while textbooks published in later years emphasised militant aspects of jihad, and presented Islam as a movement intent on world domination. In addition, Härenstam observed that primary level history textbooks contained only scant information on Islam; in contrast, secondary level books in the early 1990s were far more detailed in their portrayal of Islam, however often depicted it as a 'fanatical' religion largely in conflict with Western values (Härenstam, 1993; see also Stimac, 2018).

Härenstam's early critiques of textbook portrayals of Islam are reflected in subsequent scholarship. Otterbeck's (2005) survey study critically examined sections on Islam in seven textbooks commonly used by teachers in the southern Swedish city of Malmö. While the selective sample did not allow Otterbeck to make broader generalisations about Swedish textbooks and their treatment of Islam, the author found there was a tendency to present Islam through what he termed *Islamism*: a specific and narrow interpretation of Islam and its traditions. Overall, he made several core criticisms about the textbooks he examined and their portrayals of Islam:

- They contained errors, such as incorrect nuance of a translation, or incorrect dates;
- They featured what he called a 'tendentious choice of facts' (p. 801). Even when representations were not necessarily erroneous, the specific selection of facts made the overall representation a distortion;
- They fixated on 'Islamism', while there was simultaneously an invisibility of other forms of Islam, and,

[2] As Otterbeck (2005) observes, it has been a popular subject among undergraduate and graduate students as a dissertation topic in Swedish universities – many inspired by Edward Said's 1978 book *Orientalism*. This has led to distinct sub-topics being explored, such as Jeminovic's (2014) dissertation on the representation of Muslim women in textbooks.

- Muslims were systematically set apart in textbooks from mainstream Swedish society, in a 'we/they' dichotomy.

Other scholarship also noted that an ascribed homogeneity in textbook portrayals gives the impression that Muslims follow a singular Islamic worldview and tradition, while making little to no effort to account for cultural diversity within Islam and possible changing expressions over time (Berglund, 2015, p. 30). Otterbeck's proposed solution was that texts should be rewritten, making clear whose interpretation is reflected in the text, where he called on textbook producers to address the problematic portrayal of Islam as a homogenous worldview or social system.

While these studies primarily focused on *problematic representations* of Islam, a general *absence of content* and learning time allocated to non-Christian religions is a separate critique that has surfaced. For example, Agneta Bronäs examined textbooks for history and Swedish and found that Judaism and Jewish culture was primarily referenced through the birth of Jesus Christ, and the Holocaust. She noted that the absence of other facts about Judaism may in itself lead to Jews becoming 'the others'. She found that a Christian perspective was implicit to the texts, whereby Christianity emerges as a necessary, essential part of the Swedish identity:

> *Christianity is interwoven with the identity of the origin of being Swedish (…). The Christian perspective is predominant in the texts, often in an implicit way, through connections to traditions, and the celebrations of festivals.* (Bronäs, 2005, p. 153)

A 2006 report published by the National Agency for Education (Skolverket) echoed the findings of Bronäs. It found that Jews are mentioned on several occasions in textbooks, but in connection with persecution and the Holocaust, without comparable reference to Jewish contributions to culture and science (Swedish National Agency for Education, 2006). The report's lead researcher, Harald Runholm, argued that compulsory textbooks did not live up to the requirements set in the compulsory school curriculum for social studies (Pikkarainen & Brodin, 2008).

Swedish research has thus been critical of textbook content and portrayals, noting either an invisibility of non-Christian religions and traditions, or an absence of effort to convey the richness of non-Christian religions. At the same time, problematic portrayals of Islam and Muslim traditions have been highlighted in the work conducted by Härenstam, Berglund and Otterbeck. These studies have been rigorous and have allowed a steady gain in quality of textbook content as problematic portrayals of religion have been systematically addressed over time. Yet, with a few notable exceptions, this sub-topic of Swedish textbook research peaked in the 1990s and early 2000s. Further empirical inquiry into contemporary textbook portrayals of religion would help to ensure that such gains in quality are entrenched.

❖ Sámi representations

How have Sámi culture and Sámi people been represented in textbooks?

The treatment of indigenous Sámi culture in schoolbooks has been the subject of sociocultural analysis and critique in the Nordic countries and regions where the Sámi have historically resided (Norway, Sweden, Finland and Northwestern Russia). Across this body of research, there is a broad consensus that portrayals of Sámi in textbooks are often unrealistic or stereotypical, or brief and superficial. In this section, findings from key studies on Sámi representations in learning materials show that while national and international legal frameworks provide a strong rights-based argument to address the image of national minorities' culture and history in textbooks, deficiencies in the quality and provision of learning materials persist.

As with other representations of minority groups in Swedish textbooks, the general absence of accounts of indigenous Sámi is a clear feature of textbooks up until the 1990s (Björkman, 2019). Swedish social science and civics textbooks have been criticised for their limited and stereotypical depictions of Sámi, with only very few offering a deeper and more nuanced picture (Karlsson, 2004;

Runblom, 2006). Curriculum guidelines also seem to fall short in stipulating precisely what should be taught regarding indigenous cultures. Although the requirement for indigenous knowledge to be taught in schools is integrated into the Swedish national curriculum, and the 2018 curriculum for example offers some elaboration of the type of knowledge about Sámi that is deemed important, precise information about what this should entail remains vague and open for interpretation (Björkman, 2019, pp. 10-11).

We note some evidence that very recent contributions to this body of research consist of decolonial critique. Björkman's research reflects a theoretical lens that examines Sámi representations in textbooks as a manifestation of coloniality over indigenous peoples. Her study thus examines the depiction of Sámi in Swedish schoolbooks under the 'settler imaginary' – the idea that settlers establish particular narratives of national and indigenous identity in a nation's cultural memory (p. 7). Such decolonial critiques are also recently emerging in other Nordic countries, such as Eriksen's research on the coloniality of citizenship education in Norway (Eriksen, 2021).

The alignment of Swedish learning materials with curriculum aims on minority rights has formed a key line of inquiry. A 2006 report by the National Agency for Education analysed a selection of textbooks in secondary schools in an assessment of their alignment with the fundamental values of the curricula. The report concluded that many textbooks could be perceived as degrading or discriminatory by minority background students; in addition, it found that the sociology and history textbooks reviewed were too brief in their reflection on the situation of the Sámi in Sweden (Pikkarainen & Brodin, 2008, p. 33). In their discussions with national minority groups, Pikkarainen and Brodin (2008) reported the perceptions of pupils from these groups with regard to deficiencies in education provision for indigenous pupils. Instruction was found to be frequently organised on a short-term or unstructured basis, while problems arose in the availability of textbooks.

Beyond Swedish educational policy and curriculum requirements, national and international legislation has further provided a requirement to address minority and indigenous rights.[3] This also covers quality and provision of education and learning materials, and specific rights regarding provision of teacher training and access to textbooks are stipulated under the Council of Europe framework Convention for the Protection of National Minorities (for a comprehensive review, see Svonni, 2015). The reports submitted by the Advisory Committee to Sweden regarding its progress on achieving recommendations made by the Council to Sweden on the framework convention reveal a number of issues. The 2012 committee report noted its ongoing concerns at the 'overall lack of information on national minorities in textbooks used in Swedish schools, despite the requirements of the school curricula and despite the findings of the 2006 review of textbooks by the National Agency for Education' (Council of Europe, 2012, p. 22). It recommended a stepping up of efforts to ensure national minorities and their cultures are 'adequately represented' in school textbooks. The availability of textbooks in minority languages, particularly for Sámi languages, was also reported as an ongoing problem. A subsequent Advisory Committee report was published in 2017 that suggests little overall improvement in the five-year period – views were sought from minority representatives, who felt that information on national minorities still rarely featured in many textbooks (Council of Europe, 2017, p. 27). The Committee expressed dismay that while individual schools in Sweden determine the choice of textbooks, a review of the coverage of national minority issues in textbooks had thus far never been undertaken by the Swedish School Inspectorate, despite such reviews having been done on gender and general discrimination issues.

While we have focused on Swedish textbook representations in this section, the topic of Sámi representations has been critiqued elsewhere in Nordic research. One notable study with Sámi teachers in Finland was conducted by Hellstén (1998), which revealed teachers' concerns about the quality and appropriateness of learning materials available to Sámi pupils. Hellstén's research noted an unrealistic and romanticised picture of the Sámi people and culture in textbooks, and raised the issue that textbooks used in Finnish Sámi country were not necessarily written by Sámi authors (1998, p. 130). In Norway, education policy has also been explicit in stipulating that Sámi culture and

[3] For example, indigenous people have the right to self-determination and the right to form their own education.

history should permeate education in all subjects, yet similarly to Sweden there are concerns about how Sámi are represented (see Eriksen, 2018).

National narratives and nation-building

We note elsewhere in this review that textbooks are used to perform different functions (see Section 10 on Sociocultural Analysis). One of these functions is the way in which textbooks may be used to tell specific stories or narratives about a nation's past, or to represent knowledge for transmission that has been officially selected (Nicholls, 2006). An extensive section of research on textbooks in Sweden has examined how national narratives and ideas are reflected (and reinforced) in textbooks, particularly in the subjects of history and civic education, where this topic is treated in contemporary sociocultural analyses of Swedish textbooks. For instance, Nordgren and Johansson's critical discussion of representation of other cultures in history textbooks offers a conceptual framework for more effective intercultural learning in history education (Nordgren & Johansson, 2015). Elmersjö (2021) discussed in a recent paper the neoliberal turn in Swedish political discourse that has led to new, critical political narratives of the welfare state – evident in Swedish syllabi, education discourse, and learning materials. This section examines the contributions of Sakki, Elmersjö and other authors in this area.

Sakki's study examined social representations of European integration in textbooks in five European countries (France, England, Germany, Finland and Sweden). Her work was a content analysis of the history and civics textbooks of major educational publishers. She demonstrated that French textbooks used the 'European story' to reconstruct a French national identity, stressing the importance of France in the European integration project. The focus on the role of Europe in global politics was also reflected in German textbooks. In contrast, English, Finnish and Swedish textbooks shared a similar, ambivalent discourse about European cooperation. Sakki concluded that textbooks function as a tool to shape national identity by articulating a specific narrative of countries' distinct histories. She noted for example the following 'sceptical EU' narrative in Swedish textbooks that exists alongside optimism for European cooperation in some specific areas:

> *In Swedish textbooks the future of the European integration – the future of the neutrality policy, the euro and the EU enlargement – is perceived as something uncertain and troubling (...). On the other hand, in Swedish textbooks, a different and more positive image of the EU is brought alongside, suggesting a more active and responsible role for the EU in the areas of social and environmental cooperation. This might reflect the Swedish hope for supplementing EU with a stronger social and democratic dimension which could have roots in the Swedish social model* (folkhemmet) *(e.g. Gould, 1999). As Stråth (1993) has suggested the EU is considered as conservative, catholic and capitalist by the Swedes who have traditionally been great supporters of a social democratic welfare model.* (Sakki, 2014, p. 43)

Elmersjö (2011) looked at different meanings of 'Europe' in Swedish history textbooks over the course of a century (1910-2008). Similarly to Sakki, he examined connotations of Europe and 'European' in textbooks and how these may have been affected by political European integration projects since the Second World War. Elmersjö found that textbooks after 1950 showed strong connections to the European ideal and cooperation, but that this became even more evident after Sweden's accession to the European Union as a member state in 1995 (2011, p. 74). Since the beginning of the 20th century, the idea of Europe as an entity and European cooperation are 'robustly conveyed to school children across Sweden', where this is a common feature of contemporary Swedish history textbooks (*ibid*).

Nicholls' 2006 study examined national portrayals of the Second World War in a selection of upper-secondary level textbooks in five countries (US, Italy, Sweden, Japan and England). In his examination of Sweden, as the only neutral country in the case study selection, Nicholls observed a sense of detachment in war portrayals in Swedish textbooks, whereby Sweden emerged as a 'disengaged onlooker' (p. 99). There was therefore no sense of the transnational struggle between the

political ideologies of liberalism, fascism and communism that he observed in sampled textbooks from the other four nations. Nicholls argues that the Swedish study depicts a clear identity crisis: Swedish textbooks concede that neutrality with Nazi Germany was negotiated, but the price at which this neutrality was negotiated (the free movement of German armies and munitions through Sweden, and iron ore) is not made explicit. An increasingly conflicted perspective on Sweden's role in the war has meant that while the term 'neutral' was used to describe the nation's wartime role until the 1980s, contemporary debates have been preoccupied with the morality of remaining outside of the war, and describe instead a 'non-belligerent' nation during WWII (Nicholls, 2006, p. 91).

Reflections

Sociocultural critique of textbook content has formed a core part of Swedish and wider Nordic research on textbooks and learning materials. Some of this research has remained somewhat descriptive in its commentary on textbook portrayals and the implicit narratives embedded within learning materials, such as analytical studies of nation-building narratives. The impact of sociocultural critique has been mixed. We noted instances where sociocultural critique has successfully played a key role in flagging deficiencies in the quality of learning materials, which have in turn led to positive reform – this is arguably most evident in the case of gender representations. In other areas, and in particular concerning the representation of indigenous and other minority groups within Swedish textbooks, the impact of sociocultural critique on textbook quality has been more limited, and significant progress can still be made.

5
Digital

We believe that the market dynamics we highlight in section 7 have been in operation in Sweden - promotion of digital, some antipathy to paper textbooks, lack of clear quality criteria, high levels of supply - but that there are signs of change in the dynamic.

Contemporary research data on textbook usage is sparse, and commercial sales figures are confidential - noting of course that sales and usage data are not the same. Data on usage is most frequently available in studies of maths and science, although qualitative studies indicate high usage of textbooks in language learning. For 8th grade maths and science instruction, Sweden shows increasing use of textbooks as a primary resource for instruction. In maths, in the 2014 OECD study (Vincent Lancrin et al. in OECD, 2014), Sweden had an internationally high level of textbooks use (90% in 2003 and 97% in 2011) in instruction and was amongst the cluster of countries with consistently high use of textbooks: Norway, Korea, Hong Kong China, Russian Federation. In 2011, Sweden's usage was increasing at a rate below the OECD average but in line with high performing Japan. In science, a rather different picture of relatively low use in 2003 (35%) then increasing well above the OECD average rate of increase, to over 60% in 2011. Sayers et al. (2019) highlight an increasing tendency in maths education to import textbooks (e.g. from Finland and Singapore) as a result of the perceived weaknesses of Swedish education. Note that it is important that while they recognise this trend, they question the basis of the rationale for importation, suggesting reservations regarding the accuracy of PISA results for Sweden (under-representation of national attainment) and for Singapore (the converse) - (In Section 2 we pick up their reservations regarding the PISA results for Sweden). It also is the case that their close textual research provides an exemplar analysis of text features linked to learning models, helping to highlight the importance of the underpinning learning model, including key matters such as gradient of difficulty of tasks. While their work provides an insight into the kind of analysis which is required to unpack and understand specific texts, such analysis is uncommon for digital materials, some of which resist independent review of all features, because of the way in which they are structured. This is particularly true for 'routed' or 'adaptive' materials (see Section 12 on Paper vs Digital).

Section 12 outlines the explosion of educational technology in the last decade, fuelled by high levels of inward capital flow - 9.7 billion in 2020 (Dee, 2020). The need for wider markets in relation to

investment levels encourages international interest in Sweden, with Danish provider CLIO being an obvious key player. Market tracker Tracxn notes as of 2021, 163 new EdTech start-ups in Sweden - and for comparison, 86 in Finland (Tracxn, 2021a, 2021b). While the number and rate of providers increasing is an important issue - we have pointed elsewhere to the issue of market imperfections which impact on both quality and uptake of digital materials (see section 12). Hillman, Rensfeldt and Ivarsson (2020) highlight the way in which the relaxed State restriction of education perhaps overstated the role of private tech provision as the dominant unifying factor in education arrangements (other factors of course include State measures such as inspection, assessment, etc; local municipality influence; school chain influence; the impact of national educational debates and discourse; etc) but they highlight an important aspect of arrangements nonetheless:

> *⋯until the 2017 publication of a high level national visionary policy (Department for Education of Sweden, 2017) the push for digitisation over the past few decades was not based on strongly regulated strategies for school digitisation or national regulations for data archiving or infrastructure. Rather, the push was a response to and mainly a part of a rapid decentralisation and a rapid marketisation⋯As part of this a widespread infrastructural push of one-laptop-per-child programs across municipalities and schools has taken form. These changes have yielded a situation with little state governance where the dominant technical platforms are amongst the few centralising powers uniting schools as a national school system. Sold as ways to organise and administer schooling, these platforms are an increasingly dominant influence on how Swedish schooling is accomplished and may be becoming a de facto regulatory regime⋯*
> (Hillman et al., 2020, p. 7)

But notable new Nordic developments are shifting the form of market-provider-state relations. These include the Finnish City of Helsinki incubator hub (designed to 'combine learning and EdTech start-ups with Finnish pedagogic competence, innovative learning and academic research' (Iotkovska, 2021), whilst in Sweden the same form of private-public partnership drive to increased 'curriculum coherence' and incubator activity is present in the Swedish EdTest, working in approximately 700 preschools and schools. As we outline in the Governance segment of this report, this represents an institutionalised mechanism which drives towards curriculum coherence (alignment of curriculum content and materials; alignment of pedagogic principles and materials' etc.) which previously was present in processes such as the reports of the national school inspection service and the textbook approval process, but in a new form. A word of caution is necessary, since this 'co-ordination layer' itself holds the possibility of being occupied with multiple voices and players (Business Finland 2021; The Mayor.eu 2021). But until congestion and contradiction in this layer becomes a further difficulty for teachers making choices, such mechanisms for curriculum coherence appear important, since just as other nations such as Scotland and Norway are exploring their experience of curriculum incoherence (OECD, 2021; Restad & Mølstad, 2021) are new fractures and misalignments emerging in Sweden:

> *⋯Our analysis shows that Swedish teachers experience large competence differences in English between children. The teachers consider personalised learning technologies a promising way to mitigate these differences. However, they acknowledge that the Swedish curriculum focus on communication, seen as mainly acquired through human-to-human dialogue, does not match the fundamental idea behind many personalised learning technologies⋯* (Bunting et al., 2021, p. 1)

In section 12 of 'Changing Texts' we emphasise the importance of the underpinning learning model either implicit or explicit in each instance of EdTech. This is a feature of design, quality and impact which has been addressed in some research on paper textbooks, but even there it is not the dominant concern of the bulk of contemporary textbook research. The learning model and assumptions about learning remains a vital issue in respect of digital materials, as we argue in section 12, not least in the face of the different facilities and affordances of digital materials. In Sweden, as elsewhere, many EdTech providers and proponents cast paper textbooks as necessarily presenting an antiquated model of knowledge (Bakken & Andersson-Bakken, 2021; Kempe & Grönlund, 2019; Kress & Selander, 2012) and the discourse seems as polarised as elsewhere - see Section 6 on Anti-textbook ethos. We reject some of the highly polarised oppositions of 'skills versus knowledge', 'theory versus practice' etc (see Section 6) and consider it is important to compare the objective features and

enculturated patterns of use of both paper and digital, and be wary of the promotional discourse around each.

As part of the biases which can enter discourse and analysis we see inappropriate presumptions of 'inevitability' in future-gazing such as Keri Facer's view of the distribution of responsibilities between State, schools, tech companies, and families (Facer, 2011). After all, these are human systems and are amenable to policy intervention and action – from whatever constituencies. Also, her research shares a common pre-occupation of international and Swedish domestic research on 'digital in education' - a focus on 'personalisation' (Bunting et al., 2021; Hillman et al., 2020; OECD, 2009; Rensfeldt, 2012; European Parliament, 2020). This association between digital provision and personalised learning is prominent in Swedish research and commercial discourse on educational technology, yet our section on digital resources (Section 12) suggests that digital resources necessarily encompass an extremely wide universe of materials, displaying very different forms, and possessing very different assumptions and models of learning. 'Personalisation' and 'personalised learning' is but one driving model, and often understates the role of social learning, mixed media and complex pedagogy (Crehan, 2016).

For Sweden, there does appear to be a contrast between the nation as traditionally a high frequency user of textbooks (Lancrin et al. in OECD, 2014) and the new models of learning being proposed both in teacher training around teaching and learning materials and the latest tranche of digital resources (Kempe & Grönlund, 2019; Kress & Selander, 2012). We will mark this as 'continued contestation regarding quality of education'.

The levels of development of digital learning seem to be in line with other Nordic nations, the research seems to be consistent in volume and focus, and the development of a commitment to ensure that a strong evidence base is used for development and market knowledge (European EdTech Network, 2021; Gustafsson, 2021; Iotkovska, 2021) is a promising development.

6 Impact

In our wider review, we examine 'impact' from different angles. We noted that the research demonstrates various conditions that are conducive to textbook quality, and the positive impact of high-quality learning materials on equity and attainment. Our analysis observed that while textbook research can and has often led to improvements in textbook quality, analysis of conditions of policy and governance and how these shape textbook quality are often sporadic. In addition, findings in textbook research do not always produce policy recommendations, while in other instances there is a failure to incorporate research evidence on textbooks into policy. We see all of these themes reflected in the Swedish and Nordic research, policy and governance debate on textbooks. In this segment we summarise the key features and strengths of the state of research on textbooks in Sweden and other Nordic countries in relation to: the impact of research on (textbook) quality and use; and impact of policy and governance.

Our analysis of the rich field of Swedish sociocultural critique of textbook content showed the major steps Swedish research has undertaken to systematically assess textbook 'quality'. Nordic research has played a key role in textbook revision, and Swedish contributions are a key part therein. On the matter of gender bias and discrimination in textbook content, there is evidence that a strong tradition of research on gender representations in textbooks has allowed significant progress on addressing gender bias in Swedish textbooks. As a result, studies have argued that there is far less gender stereotyping in Swedish textbooks when compared to textbooks produced in other countries (see Blumberg, 2008). Nonetheless, our analysis found that up to date empirical analysis of contemporary Swedish textbooks would offer useful insight into the current state of representation of gender, but also other groups such as minority religions, in learning materials. In addition, it is only recently that decolonial critiques of textbooks, and their accompanying analysis of the particular narratives of national and cultural memory that textbooks often contain, are emerging (see Björkman, 2019; Eriksen, 2021). These are important avenues for further critical inquiry on textbook quality.

Nordic research has also made important contributions to examining the impact of patterns of textbook use. The question of how teachers use textbooks, particularly in maths education where textbook use is extensive, is one that has been systematically treated in the Nordic literature. Cogent and rich insights have emerged in this field: these stem from the significant and long-term tradition of collaboration between Nordic researchers and institutions on researching teaching and learning in mathematics education. This has given vital insights into teachers' perspectives, attitudes and practices towards textbook use in the classroom, such as practices of 'speed individualisation' in Sweden that contrast with practices around teaching and textbook use adopted in other Nordic countries (Hemmi et al., 2019; Johansson, 2003). We noted also instances of particularly innovative methodological approaches in Nordic research on textbook use, and a dynamic debate on the benefits of increased mixed methods research in this area (Hansen, 2018). Olof Reichenberg's (2015) research applied a classroom observation approach that showed that Swedish teachers are not entirely receptive to the government's push for greater use of computers in teaching, preferring various forms of paper-based materials – an indication that government initiatives that are disconnected from teachers' perspectives and practices can fall short. However, it is important to reiterate that understanding student perspectives and practices around textbook use remains an under-researched topic in the global literature on textbook use, where this gap is similarly reflected in Nordic studies that have largely focused on teachers' perspectives.

Analysing conditions of policy and governance in the Nordic countries allows crucial insight into the role of governance and stakeholder consensus in creating the right climate for positive impact of textbooks, and for improving textbook quality. While this has not been a significant line of inquiry in Nordic research, there are important insights that we reiterate here.

Despite a lack of State regulation of textbook quality control since the 1990s, the contributions made by Nordic researchers on whether textbooks reflect the intended curriculum (curriculum coherence) demonstrates that diverse actors – both institutional, and epistemic communities – can play a key role in the absence of the State. These contributions include Johansson's work on the implemented curriculum in maths, who noted that the textbooks reviewed in her study (commonly used in classrooms in Sweden) were 'not a corresponding image to the vision of [Swedish] educational authorities' (2003, p. 74). Although Johansson called on textbook authors to appropriately incorporate the intention of the Swedish *kursplan* and *läroplan* (curriculum) in their materials, she also noted that: (i) the lack of specificity in Swedish curriculum guidance is problematic, and (ii) the primarily responsibility for the fulfilment of curriculum goals lies with schools, rather than textbook authors. In the area of civic education in Sweden and equality between different secondary school tracks, Arensmeier's recent work compared curricula and textbooks for social studies: she found that vocational students receive comparatively more limited opportunities to develop civic abilities, increasing political inequality (Arensmeier, 2018). We noted elsewhere (see segment 2 in this section) that there is increasing interest in organised action for curriculum control among institutional actors such as publishers, municipalities, and authors' associations, and consider this a notable development that would benefit from further analysis.

Johansson's work highlighted some of the deficiencies in Swedish textbooks regarding their enactment of curriculum aims. There have been similar instances where authoritative guidance in national and international legislation on quality and provision of education and learning materials, and assessments by independent bodies, have not led to substantial improvements. One important example discussed in this review is that despite the requirement articulated in various iterations of the Swedish compulsory curriculum, most recently the 2018 curriculum, for pupils to obtain knowledge about the cultures, languages, religion and history of national minorities, research has shown that few schoolbooks fulfil these criteria in relation to representations of indigenous Sámi (Björkman, 2019; Council of Europe, 2017).

Nordic research shows that stakeholder consensus-building can play a key role in maintaining a high quality of learning materials, where this is clearly the case in Finland. While state approval over textbooks was withdrawn in the 1990s, the demonstrated capacity of Finnish textbook publishers to work in close collaboration with the Finnish Agency for Education and with teachers, to develop and to produce materials that align with the curriculum is shown to be a model that works effectively in

Finland. Teachers determine the selection of textbooks used in schools, and the previous tradition of strict quality control has played an important role in creating a consensus around high quality learning materials among stakeholders (Menntamalastofnun & Cambridge Assessment, 2019; Taylor, 2019). Examining these types of stakeholder interactions in decentralised systems can contribute to theory development of the impact of different systems of political organisation, and of historical and institutional legacies, on textbooks.

Reflections

In the global research on textbooks we see gaps when it comes to considering 'impact', and some of these gaps are reflected in the Nordic literature. In particular, a closer and systematic analysis of conditions of policy and governance and their impact on textbooks emerges as an area where further research and analysis would be highly beneficial. There are also clear strengths: a tradition of empirical research on textbooks leading to historical and systematic improvements in textbook quality, and innovative lines of empirical inquiry on the subject of 'textbook use' in classrooms in Swedish and wider Nordic research.

Whilst text features, innovation, text form, author role all are important and interesting, impact is vital. The definition of 'quality' which we have developed in 'Changing Texts' extends to, and includes, impact. Of what value are wonderful materials which do not reach the learner or teacher? Of what value are the apparently wonderful materials which have no impact, or worse, or widen gaps? Of what use are materials which sit idle on the shelf because of lack of understanding of how to use them effectively? Sweden has renewed its interest in textbooks and related materials, and we believe that it absolutely is right so to do. We conclude on this: the research summarised in 'Changing Texts' makes it clear that there is overwhelming evidence for high quality materials carrying vital functions in education arrangements. Any nation which decides to forego the benefits which such materials bring will need to work very hard indeed to make sure that the benefits are delivered through other means. The sustainable supply of high quality materials brings personal, societal, educational and economic benefit; the authors who continue to supply content (both for digital and for paper) and those that manage and support them remain invaluable for supply and realisation of these benefits.

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1

Introduction and Overview

‘...teachers are even more professional when they have a textbook...’

Åsa Fahlén (2018)

We welcomed this commission to review the state of research on textbooks and related learning materials, focussing on compulsory schooling. High quality textbooks have featured in improvement policy in some of the highest-performing system in the world and continue to feature in initiatives with proven benefit for attainment and equity.

Since the invention of the printing press, books and the printed word have been essential to the development of equal access to knowledge and have fuelled the refinement and depth of human understanding. With the escalation of the production of knowledge and the need to engage in scientific accumulation, the curation of knowledge for education systems remains vital. High quality textbooks and digital resources are essential to this, and we believe they remain a crucial part of public policy in education and training. In its drive towards improving education, we believe that Sweden is right to look at the role which textbooks and related learning materials can play in educational improvement, and utilise the value that they have for improving the professional lives of teachers and the performance of schools, and for raising attainment and improving equity.

Halfway through our review, the Covid-19 pandemic struck. With the massive disruption to schooling presented by the global pandemic, public discourse in many nations is scrutinising system performance and the shape of future education. For some commentators, this seems to have induced ‘Year Zero’ thinking; that nothing which applied previously in educational research continues to apply. We do not agree. Far from it, carefully applied insights from research resulted in elevated attainment after the interruption in schooling following the Christchurch earthquake in New Zealand, and in effective recovery after Hurricane Katrina in Louisiana USA (Hattie, 2020; Hill, 2020). Those insights now are vital for supporting those who have experienced interrupted learning through the Covid-19 Pandemic. Of specific relevance for this review, it certainly is the case that the accelerated adoption of digital learning applications has helped schools, teachers and families to support young people through the current crisis of education. But research has revealed, alongside the assets of digitally supported learning for young people, some severe limitations: unpredictable poor engagement by some individual learners; lower attainment amongst disadvantaged group; and widening gaps in attainment (Blundell R et al; 2021; UNICEF 2020; UNESCO 2021). In constructing and managing future learning, research remains fundamental to identifying which instruments (paper-based textbook or digital materials) can carry which functions, and how the qualities and characteristics of specific instruments impact on attainment and equity.

Our review includes some snapshots of research of the pandemic’s impact on learning that is very recently emerging. However, given the timeframe in which this review was written (autumn 20-autumn 21), our inclusion of this emerging research is necessarily limited. By contrast, in looking at textbooks and digital materials we have accessed thousands of research outputs, and used many hundred in the review – both seminal historic research, and recent key studies. The state of research on textbooks can best be described as ‘diverse’ and ‘uneven’. In some nations such as Sweden and England, after a decline and hiatus in textbook research we also describe the research field as ‘resurgent’ and ‘developing’. There is considerable and necessary research on the assumptions and ideology built into specific texts; there is lesser but still substantial high quality empirical work on impact using well designed, robust method; and limited analysis of production processes and market dynamics. We have found research from all continents and parts of the world, although our review is mostly limited to those in English or translation to English.

Our analysis shows that a clear ‘anti-textbook ethos’ exists in some dominant communities of educational theorists, and a dysfunctional ‘paper versus digital’ has acted to dampen research on textbooks in Europe and the US.

> *Much has been written in the literature about the work of teaching, but surprisingly little effort has been devoted to examining and conceptualizing teachers’ approaches to textbook use* (Lepik, Grevholm & Viholainen 2015, p. 130)

But things are changing.

During the early 2000s, key authors working on textbook research commented repeatedly on the falling number of research publications in the field and referred, either in passing or directly, to an 'anti-textbook ethos'. During this time, and with curriculum reform around the world occurring at a high pace, much of the rhetoric used to justify the reforms criticised what had happened before, including the content of the curricula and the established practices associated with them. This criticism included the use of textbooks and materials - whose role is so important in supporting detailed enactment of curriculum aims. The emphasis on (i) school autonomy in reform, and improvement processes and (ii) *school-level* curriculum development in teacher training contributed to the negative 'zeitgeist' around 'traditional schoolbooks'.

Our review suggests that a shift in sentiment is occurring. The International Association for Research on Textbooks and Educational Media (IARTEM) remains active and productive. The Georg Eckert Institute continues to be a hub of expertise on evaluation and review. Two subject disciplines – maths and foreign language learning – continue to be fields in which empirical work on textbooks and media is both energetic and productive. Two international textbooks summits, involving 19 nations, have been held in the past five years. While ambitious and comprehensive reviews of the role of textbooks in reform remain scarce, there are recent examples which include sophisticated and wide-ranging review of quality issues, production processes, market dynamics, and impact. And while research 'rumbles on', sophisticated processes of design, development, evaluation and use continue in some high performing systems. The detail of arrangements in high-performing, complex educational eco-systems in which textbooks play a crucial role regrettably remain known only to a relatively small group of researchers and developers – such as arrangements in maths in Japan, where systematic and systemic lesson study is part of a highly coherent process of refining sequencing of learning, structuring the content and presentation of problems, organising variation of practice, and structuring didactics and pedagogy. The textbooks are not a simple standalone entity in these arrangements, they are an integral and vital part of the educational eco-system. Not only is attainment high, but equity is good there too. Likewise, the similar arrangements in Shanghai and Singapore. In these systems, the textbooks are under constant review and careful refinement, additional empirical research and theory constantly applied, and many of the functions we list (later in this report) for high quality materials are realised in an effective and enduring way. For these nations, it is important to not simply see these arrangements around textbooks simply as 'good practice in developing high quality textbooks'. They are far more than that. The arrangements create textbooks which are the careful embodiment of the national curriculum; they provide the detail and support to teachers which enables detailed enactment of the aims, intentions and content of the national curriculum.

Of course, controversial issues of control and ideology occur also around textbooks in these systems – for example the ever-contentious issues of content representation in history books (Guex 2015), but this should not be confused with an 'anti-textbook ethos'.

While we trace the origins and thinking associated with the anti-textbook ethos, we detect not only an increase in textbook research, but a shift in tone. Widely established and powerful transnational comparative research such as Schmidt's work on 'curriculum coherence', 'curriculum control' and 'opportunity to learn' has lent impetus to work on the way in which different elements of education systems operate to support high performance and equity, throwing a spotlight both on its method and on findings on the quality and use of curriculum materials. In England, Cambridge Assessment's 2014 'Why Textbooks Count' was a controversial assertion of the importance of high-quality printed materials. It examined the role of textbooks in high performing systems and emphasised the importance of schools having high quality materials available, and the importance of nations using them in improvement strategies. The ministerial speech accompanying the launch of the report talked of his wish for a 'renaissance in the use of textbooks'. The change in thought and knowledge associated with such a renaissance may be underway.

Remillard & Taton's (2016) paper 'Rewriting myths about curriculum materials' represents the changing nature of the analysis of the role of high-quality materials. They argue that three common

assertions are mistaken:

- Myth 1: good teachers don't use prepared curriculum programs; instead, they use their own;
- Myth 2: the single curriculum approach is obsolete. Curating resources from the digital marketplace is the way to go; and
- Myth 3: when it comes to meeting new standards, the most critical investment school leaders can make is to adopt a well-aligned curriculum program (aka improvement through adoption).

Like 'Why Textbooks Count', Remillard and Taton drive complexity and evidence into the debate. Rather than simple 'yes/no' and 'good/bad' polarities, or simple empirical studies of adoption, they argue that good materials carry very specific functions and co-exist with high quality practice and professional development. This can be seen in their exploration of their first myth:

> *…Myth: Curriculum resources of any kind are viewed as unnecessary, redundant to what teachers already do or should be doing. The myth has great appeal. It is embraced and retold because it treats teachers' expertise with great reverence. This is its wisdom: teachers are critical curriculum designers and are well positioned to tailor instructional designs to the needs of their particular students. When measured against curriculum materials, teachers win every time. Curriculum materials may be taken up as an impermanent solution during times of transition, or for inexperienced teachers, but moving away from relying on them is generally viewed as the ultimate goal.*
>
> *When taken to its logical conclusion, though, the fallacy of this myth quickly emerges: curriculum materials and teachers do not do the same type of work. In short, this myth is based on and promotes an image of teachers as solo performers and of curriculum programs as props or scripts. Although these perceptions appear to honour teachers, they actually work against teaching and school improvement…*
>
> *…Through making sense of and planning with curriculum guides, teachers immerse themselves in a partnership with the authors – a partnership to which both members contribute in mutual and complementary ways…* (p. 4)

While it reproduces the important simple finding from Reynolds & Farrell's 1996 review – that, contrary to much avowed wisdom, it is high-performing teachers in high-performing systems that are most supportive of the use and availability of good quality textbooks and resources - the developing and helpful complexity of analysis of the performance of education systems is evident in the more recent analyses. These focus on understanding how different elements of arrangements have distinct functions, and co-exist in complex relations: pedagogy and didactics, curriculum content and sequencing, teacher training and professional development, assessment and so on. This combines sophisticated philosophical theory (the importance of powerful knowledge, the link between knowledge and competent practice), with practical issues of the triage and curation of discipline knowledge and empirical work on effective pedagogy and didactics. Our review goes beyond this, to ensure that the understanding of the functioning of textbooks extends to the nature of markets, approval and governance – the structure and economics of supply.

The new research recognises that the quality of textbooks varies but that the existence of poor-quality textbooks and poor deployment and use does not invalidate the important function of high-quality textbooks in effective, well-managed education arrangements. This is transcending the 'textbooks yes or no' debate, which continues to persist, particularly in reductivist on-line argument.

The supply of high-quality materials is not yet regarded as essential, or it's taken for granted in the same way in which clean drinking water is expected in modern households. But the cumulative insights from the extant research continue to point in one direction: organised presentation of well-curated powerful knowledge, provided for rather than devised by teachers, contributes to educational quality, and has a fundamental role to play in elevating attainment and improving equity.

We have not confined our review to formal peer-reviewed research. We have of course summarised the findings from formal research syntheses, such as Steve Higgins' excellent research review. But to gain full insight into the function and impact of textbooks and learning materials, and to understand debate and orthodoxy around textbooks, it is essential to review 'commentary' research, grey literature, press comment and social media comment. By doing this, we have been able to yield a view not only of the concrete assets of textbooks and learning materials, but also the social consciousness and policy views which are associated with them. This is vital for understanding the raging debate regarding 'paper versus digital' and to properly support those engaged in policy formation around textbooks and learning materials.

There are many points of interest in the review. But we draw attention to the following in particular:

1
Textbooks have an important and distinctive role in educational policy and practice
There is no body of evidence which suggests that high quality textbooks and learning materials are damaging to educational aims and practice. Far from it, there is substantial evidence that they are an important element of high-quality arrangements. They have played a role in key periods of improvement of both equity and attainment in both high performing systems and developing systems, and continue to carry vital functions. National policy which neglects textbooks and learning materials will need to use other features of educational arrangements to deliver key functions such as clarity in learning aims and values, curation of knowledge, promotion of high-quality pedagogy and didactics, and learner engagement.

2
An 'anti-textbook ethos' is evident in discourse and is inconsistent with empirical research
Our interviews and reading have led us to conclude that there remains an 'anti-textbook ethos' which stems from post-modernist orthodoxy in educational theory and discourse. This originates in a now much-criticised body of thinking about education in general – and textbooks have become 'collateral damage' in this much wider dispute. All the empirical and historical evidence, which we have reviewed, point to the considerable assets of textbooks. Yet from an entirely different tradition – essentially the philosophy of education and theory of knowledge rather than empirical educational research – there comes the 'anti-textbook ethos'. We recognise the value of cultural critique, semiotics and the exploration of relativism which post-modernist perspectives have contributed. But the review consolidated our view that the 'anti-textbook ethos' is ill-founded and at odds with extant evidence. It has increased pressure on teachers to adopt approaches which escalate their workload and has led policy makers to under-estimate the power of high quality textbooks and related learning materials in educational quality and improvement.

3
'Paper versus digital' is entirely the wrong way of presenting the options for policy makers.
We found robust evidence on the precise psychological processes associated with paper-based materials and digital resources. Debate commonly is cast in this oppositional manner – 'paper versus digital' - by individuals and organisations wishing to promote particular products or visions of educational futures – and this almost universally from the tech side of the opposition. Our examination of comparisons of the way in which paper and digital materials function at a cognitive and behavioural level suggests that they each have distinct advantages, and so both are available to educators, learners and policy makers as assets which support learning.

4
Comprehensive research is lacking
By far the most frequent research topic is cultural analysis of content. Only a handful of analyses combined aspects of text quality, pedagogic function, practice and impact, role in policy and market form/dynamics. The absence of analysis of market structures and dynamics, and the relation of this to reform policy, is particularly of concern - and makes this review an important contribution to the field.

5
Market structures must feature in policy construction
We found scant research on the market dynamics of a dependable supply of high-quality materials, both paper and digital. This is a substantial and important gap in research. We therefore examined

the way in which market arrangements have been configured during times of educational improvement, and in high performing systems. We remain concerned that the extreme diversity, lack of transparency and extraordinary proliferation of digital learning resources is developing a very imperfect set of market arrangements. There is no clear conception of ‘quality’ and no simple means of swiftly understanding the characteristics of each digital resource. This asymmetry of supply, marketing and consumer knowledge results in chronically imperfect market dynamics. This dynamic does not support an impetus towards quality. This is not a criticism of digital materials; it is recognition that quality is unlikely to be driven automatically by current market dynamics. This is a very serious matter for educational policy makers seeking improved equity and attainment. When combined with the false opposition of ‘paper versus digital’ rhetoric and ‘anti-textbook ethos’ it creates a policy environment in which the asset of textbooks may be both under-recognised in policy and underutilised in action.

We took great pleasure in the review. Searching and reading was split between the authors, but all writing and analysis was undertaken jointly. We hope that the review contributes to focussed and effective educational development in Sweden.

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Cambridge 2021

2

Commission

A wide-ranging international review of research on textbooks and related materials

Our research on textbooks and the analysis of their functions has excited considerable international interest, and was central to the first and second international textbook summits (London 2018 and Reykjavik 2019). Interest in Sweden has resulted in a series of presentations 2017-2019 and meetings regarding our work. Alongside this, we see increased Parliamentary discussion in Sweden, more active press discussion and Stockholm Municipality's increasing interest in quality criteria as very important developments. The commission for this literature review grew out of these discussions and developments, and includes an important thread - the recognition and preservation of the expertise of textbook authors. Quality criteria relating to the form and content of textbooks and related materials are important; but our criteria go well beyond this, to the production and evaluation processes, governance and market arrangements, and the expertise of publishers and authors. If textbooks have a role in 'steering' education, nations need to preserve the capacity for supply of the highest quality materials - something under considerable discussion in Poland and Iceland.

This commission from Läromedelsförfattarna to survey research - to identify gaps as well as key contributions - is an important contribution to development of effective public policy in national education, both in Sweden and in other nations.

Sweden's relative decline in international comparisons has stimulated considerable national reflection and discussion. But recognising that a problem exists, identifying precisely the nature of the problem, and devising appropriate solutions are separate and demanding tasks. The radical model which Sweden adopted during the 1990s in respect of the governance of schools appeared to have at its heart assumptions that quality (high standards, educational experience, innovation) would be elevated by the internal dynamic of school competition (Björklund et al., 2005; Böhlmark & Lindahl, 2007; Edwards, 2018; Government of Sweden, 2020; Kornhall, 2013; OECD, 2013, 2017; Sahlgren, 2011). Liberal economics has at its heart the 'invisible hand' notion - a justifiable sense that certain public goods are provided by configuring economic and other systems principally around competitive arrangements, without requiring detailed direct control and oversight by the state of all interactions. Notably, Adam Smith saw education (along with justice and transport infrastructure) as not being solely delivered, or deliverable, through the action of markets. Martin Wolf's seminal London George Orwell lecture outlined the key public goods which would and could not be delivered by market action alone in advanced liberal economies. In other words, certain 'steering', stimulus and maintenance activities are required in social systems such as schooling, in order to supply the universal access to high quality education (both in respect of equity and attainment) which Adam Smith envisaged as being essential to rational, peaceful and prosperous society (Smith, 1776; Thomas, 2017).

This provides the link into a discussion of the role of textbooks and related materials. Teaching materials can, and have in some nations, been left to 'the market', but the transnational analysis undertaken by Cambridge Assessment suggests that market dynamics are inadequate for driving materials to the highest levels of quality, and that certain drivers and incentive structures can stimulate materials in the wrong direction (Cambridge Assessment 2019). For example, with its strong focus on examination results as a means of judging school performance, England has seen the emergence of extremely instrumental, narrow materials which focus on exam preparation (Mansell, 2007; Stobart, 2008).

Conversely, State action has not been universally beneficial. While some states have developed sophisticated negotiated arrangements with private publishers (Singapore, Hong Kong), other nations have intervened in markets in a manner which threatens supply (Poland, Denmark). These case studies are discussed in detail in this report.

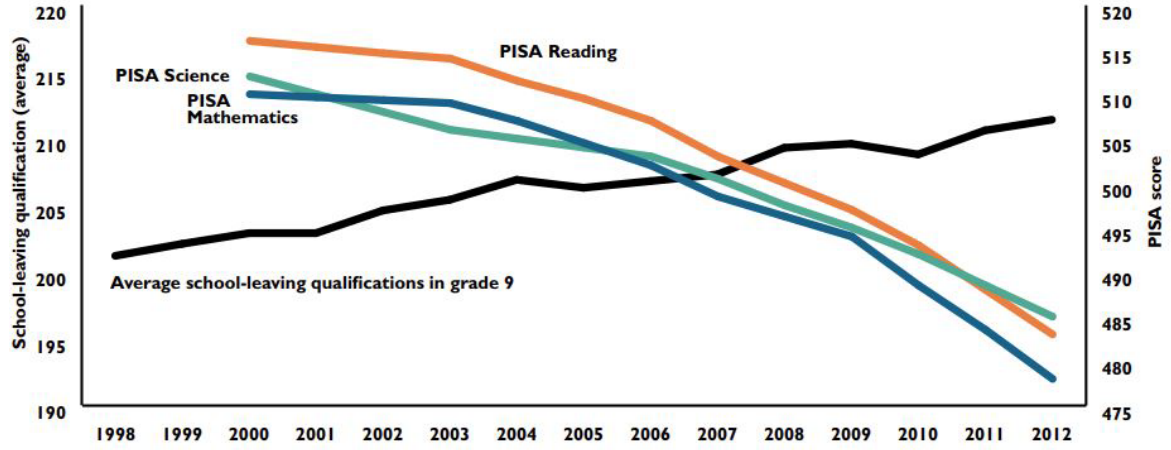
In our previous work, we have identified a complex, interacting set of factors which govern form, quality and supply of education materials (Cambridge Assessment, 2017). Our analysis suggests that the highest quality materials around the world carry a wide range of functions, and that to ensure that materials are of the highest quality and deliver maximum benefit, it is necessary to undertake careful construction and management of the public-private relations regarding supply of learning materials. The ambiguities regarding market and State responsibilities which have run through Sweden's

discussion of provision of education are likely to run through efforts to understand the role and performance of textbooks and related learning materials.

Sweden's period of declining PISA scores in the second decade of the twenty first century prompted protracted debate about the impact of the 1990s reforms. With PISA scores improving in the 2015 and 2018 PISA surveys, and Sweden ranking in the top ten in Europe, fears of a process of continuous decline have been abated. But the forensic analysis following the 2013 'wakeup' results yield insights vital for a deep understanding of the characteristics and performance of Swedish educational arrangements.

A focus on both the fractious debate about the possible causes of Sweden's decline and the palpable relief at the recent rise in PISA results can easily create neglect of some of the most important research on the performance of Swedish arrangements. In Henrekson and Jävervall's 2016 report, their comparison of the trends in school-leaving grades which teachers assign to students (significantly *up*, over the period 1998 to 2012) versus the underlying performance of Sweden in PISA over the period 2000-2012 (significantly *down*) indicates serious grade inflation *combined* with decline in underlying standards. Wikström & Wikström (2005) drew attention to significant structural inflation in grades at the beginning of this century, and this was confirmed in Henrekson and Jävervall's work (see also: Kools, 2015). It is this inflation which presents a serious public policy issue in Swedish education.

Figure 1: Sweden's average PISA scores (2000–2012) and the average school-leaving qualifications in grade 9



Source: Swedish National Agency for Education (2001, 2004a, 2007, 2010, 2013), SIRIS (Swedish National Agency for Education) and OECD (2015).

(Henrekson & Jävervall, 2016, p.16.)

Even if underlying standards rise (as measured in PISA), there is no comfort if the system meanwhile is suffering from grade inflation, since this means that the integrity and effectiveness of national and local evaluation, educational management and grade currency all are threatened. This is particularly important in respect of equity. Inflation in education systems typically is unevenly distributed (Cambridge Assessment, 2010; Coe, 2013).

Certain schools may inflate their grades and then others will run to catch up, sometimes overtaking those that they are chasing. When this occurs, standards are not being maintained; equity in outcomes becomes difficult or impossible to monitor and assure. Even in a context of genuine increases in underlying attainment, as appears to be the case in Sweden, national certification in which standards are not being adequately controlled represents a severe problem in public policy and in maintenance of the public good.

Just what does this have to do with textbooks and related materials? Action to curb grade inflation and to ensure standards are upheld needs to be multi-faceted and sophisticated. Even in systems

with a large component of external examinations at 16 and 18, grade inflation can be both a threat and an actuality (Cambridge Assessment, 2010; Coe, 2013).

Textbooks are not the sole antidote, but transnational analysis suggest that they play an important role in public policy on national standards. Sophisticated materials (from around the world) include content in a well-ordered sequence, communicating the 'depth of treatment' of specific topics and subject areas. They include assessment items (questions and expected answers) related to the content, which can help to both enrich classroom discussions and communicate expectations and standards of attainment - to pupils and to teachers.

These 'elements' of textbooks are part of the way in which textbooks function to give greater substance to National Curricula - the top-level general statements of content which the majority of advanced states now possess as guiding specifications for their education arrangements. When we undertook our analysis work on national curricula in high performing jurisdictions (2010 onwards), we initially were surprised at the very general nature of national curricula in some nations. Our policy work with these nations then showed clearly how approved textbooks were used (e.g. in Singapore and in Finland during its time of improvement) to give tangible form and clear day-to-day reality to an otherwise highly generic national curriculum. This process of 'articulation' through detailed textbooks was essential to delivering the aims of the national curriculum on the ground, in classrooms.

Communicating through textbooks the 'depth of treatment' and 'expected outcomes' does not ineluctably restrict grade inflation, but in embedding a sense of depth of treatment and expected outcomes these contribute to the concept of 'national standard'. At the same time, equity is enhanced by all pupils having visibility of higher level of materials and expectations (Schmidt's important concept of 'OTL' - 'Opportunity to Learn'). In some jurisdictions (Hong Kong, Singapore), textbook chapters include both checks of understanding though carefully-devised questions and sample exam questions (Oates, 2014). Again, this helps to convey a sense of depth of treatment and standards, but also familiarises pupils from an early age with the form and content of formal question they may face.

This begins to unpack the sophisticated functions carried by textbooks which the Cambridge Assessment transnational work has identified. Our work has been highly empirical - based not only on scrutiny of research but also on the structured comparison of textbooks and related materials from high performing systems. We do not reify or fetishise textbooks - they are part of the *range* of instruments and actions which advanced systems have used to effect responsible 'curriculum control' (Schmidt & Prawat, 2006; Cambridge Assessment, 2017).

This concept of 'curriculum control' is important. Although the use of the term 'control' seems exclusively to suggest top down, autocratic control of arrangements, this is not the case. Schmidt's analysis of the necessity for curriculum control makes clear that it can be secured through many different forms of governance and administration, including highly participative and negotiated forms (Schmidt & Prawat, 2006). What is clear from our transnational analysis is that textbooks and related materials constitute important 'steering mechanisms' of education - and were referred to as such in Finland. Our research has identified a set of important and varied functions of textbooks. Not all examples carry all functions: what a specific example carries is the result of the design and commissioning processes present in specific national settings:

Textbooks: functions

- ‘Steering mechanism of education’ — mediating National Curriculum/National Standards
- Reducing teacher workload
- Conveying values and models of ability
- Delineating learning progressions and sequences
- Focusing on key concepts, principles, operations and core knowledge
- Providing ‘intelligent practice’
- Helping understand ‘depth of treatment’ of ideas and content
- Exposing pupils to ideas
- Supporting ‘production’ (writing, speaking, drawing, etc.)
- Providing formative assessment, pre-assessment and end assessment
- Allowing pupils to go backwards and forwards through a subject — rehearsing, revising, anticipating
- Giving pupils a sense of the ‘size and scope’ of a subject–a schema
- Supporting reform, improvement and maintenance of quality
- Supporting home–school links through homework exercises, discussion in the home
- Disseminating good practice
- Helping with curriculum continuity when teachers are absent or change
- Moderating the adverse impact of variation in teacher quality
- Encouraging wider reading, research and analysis.

(Menntamalastofnun & Cambridge Assessment, 2019)

Curation of human knowledge is vital – and textbooks and related materials play a key role in the transmission and accumulation of powerful knowledge. But in addition to this fundamental purpose, they carry so many functions that are essential to high performing systems. This commission helps to understand and articulate those functions, supporting the development of far-sighted, evidence-based public policy.

3

Executive Summary

On textbook quality

- **Few studies on textbooks have seriously examined 'quality' of textbooks as a variable.** This acts as a real limitation on textbook research. There is a current two-pronged focus on 'availability' of textbooks as a proxy for quality, and cultural critique of textbook content and bias. While important, these approaches do not together form a comprehensive review of textbook quality.

- **Objective features of textbooks and their relation to learning have formed only a small part of textbook research on quality**. Research in this area has emerged from the field of language learning, early learning, and literacy; and, in parallel, from non-academic fields of technical study within editorial and authoring works. However, these two distinct fields have developed largely in isolation. An increased focus on overt, tangible features of texts, and their development in relation to theories of learning, will do much to address the research gap between research on textbooks and day-to-day professional discourse on textbook development.

- **Quality also resides in curriculum coherence**: the coherent relationship between the features of textbooks and related learning materials, curriculum aims, curriculum content, and pedagogic practice.

On the existence of an 'anti textbook ethos'

- **There has been substantial commentary around the future of textbooks in classrooms**, with suggestions that textbooks are 'obsolete' or 'outdated'. This commentary extends over the last many decades. These arguments are **often poorly grounded**, and the empirical evidence to support them is lacking. In contrast, in reviewing the evidence from a range of countries and contexts, the case in favour of high quality print learning materials is overwhelming.

- **The low prioritisation of textbook research in some countries has links to the anti textbook ethos.** Cultural and popular attitudes towards textbooks contribute to the lack of serious academic scholarship on textbooks as learning materials outside specific countries.

- Systematic, comprehensive review of the efficacy and value of learning materials enables us to understand **variability in quality, textbook design, and patterns of use**. Investigation into the future role of textbooks should focus predominantly on high quality materials and examine their use.

- **The wider education policy context of intervention cannot be ignored.** By reviewing practice in high-performing education systems such as Singapore, Finland and Hong Kong, the analysis confirms that high quality textbooks function as a highly effective tool when forming part of an elaborated, coherent education policy. **Effective links between curriculum, instruction and materials** are important.

- While foundational knowledge does change and expand, **fundamental changes such as paradigm shifts in knowledge are relatively uncommon**. Knowledge does not change in the manner or at the pace suggested by critical accounts that argue knowledge in textbooks is by definition outdated. The claim that textbooks necessarily represent a flawed or outdated model of human knowledge is not an inherent truth and can be contested.

On governance

- Patterns of textbooks approval and selection vary both *between countries* and *within national jurisdictions*. Approval and choice patterns can also shift rapidly. Research on the locus of

control around textbooks, and the wider policy context, is of critical importance in understanding the efficacy and value of textbooks. However, while **governance and textbook reform are closely connected, research in this area remains limited**.

- Legacy, understood as **the influence of previous policy in contemporary policy and practice**, plays a critical role in conditioning present learning materials. Similarly, when examining which materials are deployed in different settings, **supply patterns and choice of materials** must be examined.

- Curriculum control is a necessary prerequisite to curriculum coherence, and therefore in improving attainment and equity. It is **less clear which forms of governance are best suited to ensuring a supply of high-quality materials**. This points to a research and knowledge gap on market structures and the impact on learning materials produced for schools.

- **State-publisher relationships**, which relationships of dependency, shape the processes of textbook production and governance. Dynamics of textbook production are tightly linked to market structures that publishers operate under.

- **Market restructuring** can shape dynamics of textbook production and supply, sometimes in dramatic ways. Rapid restructuring can have detrimental effects on the textbook production process and may act as a threat to established publishers, such as has occurred in Denmark and Poland. Market restructuring also occurs for political reasons, for instance to support nation-building narratives.

On authorship, publishing and markets

- **Textbooks authors are not passive agents in the textbook production process.** Examining the processes by which textbooks are authored and published in different countries is an important enterprise. In particular, understanding who authors are, their incentives to participate in textbook authorship projects, and the editorial constraints and market conditions that authors operate under, will help to address the research gap on textbooks.

- The process of mediation and adjustment in textbook production that occurs **in author-publisher interactions** influences what ultimately is printed on pages.

- While textbooks make up a significant portion of the publishing market, publishing research looks only briefly at textbooks, constituting an important knowledge gap.

- **Countries with specific socioeconomic or demographic characteristics face particular challenges** in sponsoring authorship and in-country publishing of learning materials. Small population size and low-income status are examples of characteristics that may create reliance on acquiring materials written and published abroad, and/or create significant market and funding challenges.

- **Conditions of policy, governance and market forces differ by country, but substantially influence textbook content.** In particular, we highlight implications when non-educators increasingly make pedagogical decisions; the tendency towards standardisation of content; the unequal influence exerted by some sub-national states, regions or districts on publishing houses; and the rise in publisher-led in contrast to author-led - writing projects.

Patterns of use

- **Beyond content, structure and physical availability of textbooks, it is important to consider how textbooks are used in practice.** This involves understanding how textbooks are 'enacted' or 'implemented', where implementation varies according to factors such as teacher training and cultural context.

- **High quality textbooks have intended patterns of use.** In particular, textbooks function as a guide to curriculum content and learning structure; embody curriculum goals and parameters which should be used to inform and guide classroom instruction; and are often used to ensure an accurate following of the curriculum in both depth and breadth. Materials and activities in high quality textbooks also serve to decrease teacher workload, while well-designed textbooks can guarantee knowledge requirements from the curriculum and support the planning and presentation of subject content. Textbooks are also useful as a guide for independent study for students by providing structured learning activities and opportunities for self-assessment.

- Several factors can affect how textbooks are enacted in the classroom. This **may lead to deviation from the textbook's intended use**:

    - Governance and curriculum policies, such as autonomy in the selection of textbooks, political strategy, and government funding limitations influence patterns of use.
    - Inadequate teacher training can limit the effective use of textbooks.
    - Learners may be restricted in making active use of available textbooks. There may be limited availability of textbooks that meet learners' specific needs; or textbooks might be physically available, but learners may have only limited access to them. Learners' dispositions towards textbooks also are very significant in explaining use and impact.

Sociocultural analysis

- **Sociocultural studies have enabled constructive critique of the presentation of knowledge in textbooks.** Analysis of textbook content that deconstructs political, social, and economic perspectives implicit within textbooks enables debate on how sociocultural factors influence or inhibit textbook quality.

- **There are examples of textbook revision and regulation of content** in different national contexts, where revision reflected specific narratives around nationalism, nation-building, and religion. The analysis of these biases in historical textbook incidents carries **potential for lesson-learning beyond individual cases**: what learning goals are prioritised, who is involved in textbook development, and how are textbook topics selected?

- **Although sociocultural critique has made important contributions to the review of textbook quality**, some sociocultural analysis is also prone to **perpetuating misconceptions** around textbooks. This includes the tendency to position textbooks as the dominant, authoritative source of knowledge in the classroom, thereby negating teachers' and learners' access to other forms of knowledge, and feeding the 'anti-textbook ethos'.

- **Socio-cultural studies on textbook content have focused on representations of gender, sexuality, nationality, race, and social class.** However, the increased awareness around socio-cultural representation has largely failed to produce results in terms of contributing to textbook theorisation, while concrete recommendations for future practice are often absent. In this sense, the larger impact of sociocultural critique is still limited.

Impact

- **Are textbooks effective?** Throughout this report, 'impact' is examined from different angles: impact in relation to textbook quality; the tendency in research to focus on textbook availability at the expense of a more holistic perspective on textbooks, quality and impact; and the necessity of examining textbook impact in the context of patterns of textbook use. In different thematic areas, we note the **research has demonstrated various conditions for positive impact of high quality learning materials** on equity and pupil attainment, and summarise the state of the literature on impact in relation to textbooks.

- While rigorous research can determine ways in which high quality learning materials can positively influence equity and attainment, **findings in (textbook) research do not always lend themselves to policy recommendations;** in other instances, findings are simply not used to inform policy. We note the wider context of debate around impact in social research, and the need for evidence-based policy formulation. The impact debate has important implications for education research and policy: in particular, the need for specific interventions regarding textbooks and learning materials to be based on sound research evidence.

- **Policy and systems of political organisation define the market conditions of textbook production**. Evidence strongly indicates that prioritisation of quality in learning materials, and close cooperation between key stakeholders in textbook production, leads to positive impact.

Paper vs Digital

- The research on 'paper vs digital' yields a picture that is highly nuanced. The aggregate findings of studies on digital learning materials do not produce a clear-cut conclusion that digital is always 'good' or 'bad'. We note that **variation in digital applications and their use, and variation in the model of learning practices and cultures,** invariably produce mixed findings on the use of digital technologies in classrooms.

- A major challenge in comparing paper-based and digital materials is the **considerable variety in form and function in digital learning resources**. There is nonetheless a **need for balanced comparison**: where the characteristics, respective advantages and disadvantages of each are systematically compared, so that findings may form the basis of well-evidenced advice to policy makers and educationalists.

- To ensure quality, accumulation of understanding and the development of formal or informal standards, we **need to understand the way in which specific digital resources function**, and the way in which those functions link to elevated equity and attainment in education.

- There is **still little analysis of the processes of reviewing digital resources**, and the implications thereof. How much time should be devoted to reviewing digital resources? What are the appropriate steps and procedures? What are the implications for increasing cognitive workload of teachers and officials? We note in particular the **presence of knowledge asymmetry in the digital resource market**: purchasers are not always well equipped to navigate available materials and to make robust judgments regarding quality of materials. This raises important public policy questions.

4

Methodology

What do we mean by 'a textbook'?

Throughout the document we use the term 'textbook and related materials'. As late as the 1990s, the answer to the question 'what is a textbook?' would have still been relatively simple. Although textbook content was beginning to become diverse and elaborated, and learning technology was nascent, the formal paper textbook was known and understood. For this review, we have accessed research work over the last 50 years, at a time when paper textbooks now co-exist alongside fully on-line digital materials, and often exist as a combined paper and digital 'bundled product'. The 'target user' of these bundled products can include both the teacher and the learner - and private tutors in many national settings. Where materials are used for home study, users can include parents.

It may also be important to consider 'users' in a wider sense: governments which rely on private publishers to deliver textbooks in support of national curriculum aims and for implementing national curricula; exam agencies who endorse textbooks as supporting learning leading to tests and assessments; and researchers, who use them to understand education arrangements.

When we use the term 'textbooks and related materials' in our analysis we are referring to a literal or digital object which collates and curates human knowledge into an organised form, and which explicitly or implicitly supports and structures learning activities which result in transformation of human thought and action. They are not simple objects. All of our research and the research that we have accessed for the review suggests that issues of quality are complex. The functions which textbooks and materials support are wide-ranging and important for the performance of systems and individuals' learning, and the contextual conditions which allow continuing supply and development require careful management.

We recognise that contemporary textbook policy in leading jurisdictions includes accompanying teacher professional development on how to use the textbooks.

The research we have accessed covers the full range of learning materials from 'traditional' paper-based textbooks to fully on-line digital materials. We try to be clear throughout as to what each piece of research is referring and what we are referring to in our commentary.

In summary, a typical 'bundle' in 2021 can comprise:

- A teacher's guidance - with accompanying professional development
- A pupil textbook
- A pupil workbook
- Linked on-line assessments
- Linked on-line activities and enrichment resources

In Section 12 on 'Paper versus digital; paper and digital', we included consideration of fully digital materials which carry the functions of the components we list above.

Literature

For this report, researchers at Cambridge Assessment used both traditional and non-traditional literature reviewing techniques. Although many of the studies examining textbooks and learning frequently state that 'there is little in this field' – and indeed we have highlighted in this report where important research gaps exist – we have still found a wealth of material on key topics. Our use of traditional literature search methods, searching for and accessing research on our nominated topics (detailed below), allowed us to pursue the network of citations which are present in that literature. The plethora of online comment - often in the form of blogs, but also other relevant grey literature - especially technical reports and conference proceedings - has been accessed using internet search terms related to our key topics plus 'textbooks' or 'learning materials'. We have furthermore included commentary from news articles where it provided important insights or context, and was corroborated by research.

We thus carried out a thorough literature review of the interdisciplinary field of textbook research. During the exploration phase of this review, the research team completed a search of all University of

Cambridge library collections and 22 literature databases including:

- ABI/INFORM Complete,
- the Directory of Open Access Journals (DOAJ), ERIC, JSTOR and ProQuest.

Searches were conducted using the terms:

- ‘Textbook’
- ‘definitions’,
- ‘function’,
- ‘impact’,
- ‘use’,
- ‘digital’,
- ‘market’,
- ‘publish’,
- ‘author’,
- ‘develop’,
- ‘policy’,
- ‘approval’,
- ‘access’
- ‘supply’

The reference lists of these initially collected sources were also reviewed as a means to discover additional texts.

Relevant sources were added and analysed as they emerged, whereby this report encompasses several very recent studies and policy reports. In addition, sources written in Swedish and French were used, reflecting language capabilities of in-house and external researchers involved in the production of this report.

Interviews

Our analysis draws on interviews and conversations with publishers, teachers, civil servants and ministers in fourteen countries. These interviews were conducted by Cambridge Assessment researchers over the period 2011-2020 and have informed this report's analysis and findings.

Table 1: List of interviews

Location	Participants
England	publishers, teachers, officials, ministers
Denmark	publishers, teachers, officials
Finland	publishers, officials, teachers
Iceland	publishers, officials, minister
Indonesia	teachers, officials
Kazakhstan	publishers, teachers, officials
Kenya	teachers, officials, ministers
Japan	officials, ministers
Latvia	teachers, officials
Poland	publishers, teachers, officials, minister
Singapore	publishers, teachers, officials
Shanghai	Officials
Sweden	publishers, teachers, union representative, officials, politicians, minister
Thailand	officials, minister
International Publishers Association	Publishers
Publishers Association (UK)	Publishers

Limitations

One limitation which remains is that the work has been undertaken through accessing principally English-language research, or translations into English of other-language research. We have strenuously sought to avoid the Anglo-American bias which can arise in literature reviews in this and other fields. We are very aware of a rich tradition of discourse about textbooks in the Nordic countries. While we have accessed some of this, our coverage is partial. We are concerned that textbooks were of high importance in Russia and throughout the former Soviet Union, and we have only partially accessed this literature through external research reports such as those published by the World Bank, although insights have come through our interviews in Latvia and Kazakhstan. Likewise, the discussion in German and Japanese language, which we have only partially accessed through the work of TIMSS and studies published in (or translated into) English.

5

Textbook Quality

Quality varies. This variation can be explained by modern approaches to textual analysis (Patrizi, 2016) yet few studies include quality of the textbooks – either as a variable or as anything other than briefly mentioned as a binary or crude characteristic (e.g. 'high' or 'low' quality) of the textbooks in the research. As a result, most studies using 'availability' as a variable simply state 'quality of the textbooks was not measured in the study'. This operates as a real limitation on textbook research.

Scanning the field, textbook research seldom engages in a comprehensive review of quality. Research engages principally with (i) availability - with some 'availability 'studies examining impact on attainment - and (ii) cultural critique of content. Both of these approaches are extremely limited perspectives regarding quality.

Availability and cultural critique

The 'availability' analysis treats 'impact' as a proxy for 'quality'. In one sense this is acceptable. Since the aim of education typically is to secure attainment and equity, any instrument such as a textbook may be considered to be of high quality if it raises attainment and improves equity. However – as many of the availability studies acknowledge – this does not improve our knowledge of how a specific textbook functions, or how elements of its design can be managed to optimise learning.

The cultural critique analysis treats 'addressing bias' and 'revealing cultural narrative' as a separate proxy for 'quality' – with the implied notion that reducing bias will enhance quality. The issue of impact of such adjustments essentially focusses on the (i) the extent to which textbooks reinforce existing power relations; (ii) the extent to which content links to the cultural context and consciousness of individuals, thus improving 'accessibility' of content – essentially the 'availability' of the text at an individual level; (iii) the extent to which addressing bias will improve representation of a wider range of social groups in learning materials – thus improving 'availability' of texts to those groups; and (iv) the extent to which addressing bias will help to confront issues of Eurocentrism and racism in education, curricula and learning materials, and thereby improve the accuracy of presented knowledge.

Universities and schools have become key sites where debates around decolonisation are taking place, and where the issue of narrow cultural representations are being challenged. In particular, history curricula and textbooks have been subject to critique on such grounds, in different national contexts. Lidher, McIntosh, & Alexander (2020) for instance argue that history taught in schools in England remains a key site of statebuilding through the transmission of a selective historical narrative, while content of curricula and the 'assumed authority of teachers and textbooks [asserts] which chapters in history should be taken as significant and which can be ignored' (p.7). Japanese history textbooks have been the subject of controversy in neighbouring East Asian countries where textbook narratives and their portrayals of Japanese colonial wars and the annexation of Korea have been highly contested (Guex, 2015). In countries with minority indigenous populations, textbooks may lack inclusive language or have missed opportunities for promoting anti-oppressive education. This has been found in the representation of Sámi culture in Norwegian textbooks (Eriksen, 2018). In South Africa, a ministerial task team concluded, in a 2016 report, that content of textbooks in several subjects examined was inadequate in terms of gender and race representation, and guilty of a 'middle class normativity' (Department of Basic Education of South Africa, 2016, p. 187).

These debates are undoubtedly important. Within the scope of appraising textbook quality, however, we consider this form of analysis as only partial.

Textbook analysis has been used as a means of probing curriculum coverage, sequencing and depth of treatment within national systems. TIMSS researchers laid some founding principles for this (Houang & Schmidt, 2008) and while it contributes to understanding the function and general effectiveness of textbooks in articulating national level curriculum intentions, it includes little detailed analysis of text features.

The state of research on textbooks

Few past studies have examined objective features of textbooks in relation to their impact on learning. The exceptions are in the fields of language learning, early learning and early literacy. By contrast, assessment research has paid considerable attention to the way in which small alterations of language and presentation affect reader's comprehension and reaction (Crisp & Sweiry, 2006; Pollitt et al., 2007).

This body of research essentially theorises the impact of text features as well as both exploring and quantifying impact. It has direct implications for the assessment items which textbooks contain, but also carries general implications for textbook design and evaluation. It shows that minor variations in 'information elements' and formatting can significantly affect interpretation of and reactions to text features.

Maths textbook have enjoyed considerable systematic attention; including systematic approaches such as Sunday's work in Nigeria (Sunday, 2014) and key projects such as 'Singapore Maths' and the recent maths textbook work by the NCTEM in England. It is important that these have attended to the detail of the way in which 'information elements' and text features support the explicit and specific learning models which have been adopted for the initiatives (Boyd & Ash, 2018).

While textbook research stretches back many decades, *few studies* engage with the analysis of 'text/information elements', 'structure' and 'function' which are present in contemporary analysis of text forms (see: Textbook & Academic Authors Association, 2016).

In contrast to academic research on textbook impact, the expression of 'textbook (information) elements' is well-developed in practical editorial and authoring work on textbook development, although fluid and flexible in the way in which 'elements', 'structural features' or 'text features' are defined and described (Krause, 2001; Montagnes, 1991; Zappaterra, 2002). The variation suggests under-developed theorisation of this level of both development and description of 'information elements' of textbooks. In addition, these varied frameworks focus on the overt, tangible features of texts, such as text presentation and organisation, and the quality of images used in textbooks (see Buch, Bundsgaard, & Fougt, 2019; Marsden, 2001). While cultural critique does focus on implicit aspects of texts such as bias, enculturated signalling and 'messaging', this tends to neglect analysis of extremely important implicit or hidden drivers of text forms and content: models of progression, pedagogic and didactic models, assumptions about ability and 'OTL' (Opportunity to Learn) – elements which are beginning to be examined and understood in more detail (see Boyd & Ash, 2018; Cambridge Assessment, 2016):

- Progression: the sequencing of material and the way in which learners are expected to move through materials – as individuals, as groups, etc. Our comparisons have contrasted models of 'individualised learning' (which assumes that each pupil will move at their own pace and follow their own preferences) versus 'paced and socially-based learning' which assumes that learners will master material collectively and move forward as a group (exemplified in Japanese textbooks and the new primary maths textbooks in England).

- Pedagogic and didactic models: which in particular affect the balance of teacher directed activities and learner-managed or learner-initiated activities. Very frequently, textbooks and educational materials are simply conceived and developed in a specific national educational context, assuming or being determined by the dominant learning model(s) in the national context. The underlying learning model(s) thus remain assumed and implicit. For example, Shanghai textbooks have very specific models of practice and variation of problems in maths, while Singapore textbooks have a strong commitment to 'verbal problems' in maths, designed to both stimulate thinking and make clear underlying mathematical structures (Boyd & Ash, 2018). The 'learning journal tasks' in Singapore textbooks appear as an interesting and practical activity, but are located in theory regarding the importance of periods of quiet personal reflection after learning, and encouraging the pupils to think about subjects outside class contact time – both factors associated with higher attainment (H. Li, 2001).

- Likewise, the assessment tasks in some materials are sequenced to ensure that misconceptions are revealed quickly (the ’10-minute concept check’ in Singapore maths) and made obvious to the pupil (for reflection) and to the teacher (for action).

Exposure and OTL: materials from some systems have strong ‘routes’ through the materials, affecting exposure to ideas and content. For example, England has ‘tiered’ qualifications – with ‘higher tier’ examinations for higher attaining learners, and ‘lower tier’ examinations in the same subject for lower attaining learners. Material in the same textbook can be labelled for the ‘higher tier’ or ‘lower tier’. When this occurs within the same textbook, the learners have the opportunity to see and work through the higher tier material, even if they self-elect or are directed not to do so. Some other publishers for the same exams split the material between different volumes, so lower tier learners do not have the opportunity to examine (OTL) or the exposure to the more demanding material. In textbooks in Japan and Hong Kong, there are ‘extension tasks and problems’ which ‘stretch’ the higher ability learners, and can be seen by lower tier learners.

These learning models sometimes are implicit in the materials for learners but made explicit in teachers’ guides and professional development associated with specific textbooks and textbook series: for example, the ‘Brunerian’ model at the heart of the Singapore Maths textbooks.

The gap between research on textbooks and the day-to-day professional discourse on development of textbooks means that textbook quality is well-established not as ‘academy theory’ (a coherent body of theory and allied empirical research) but as ‘professional craft knowledge’ (Lave, 1991; Panter, 2012; Winch, 2017).

Examples of three practice-oriented frameworks are given below. They list features which we have labelled ‘information elements’ in our transnational textbook analysis, allowing us to identify unique elements, link elements to intended and actual function, and link elements to underlying theory and assumptions (American Psychological Association, 2001; Fleming & Levie, 1984).

The ‘information elements’ and physical ‘array’ of material on the page also provides what Helen Abadzi refers to as ‘points of stimulation’ (Abadzi, 2006) which, on a typical two-page textbook spread, can be richer and more numerous than what is typically displayed and displayable in on-screen materials.

We include multiple frameworks since, although they each are helpful and valuable for both development and review of materials, there remain competing frameworks, each distinctive, each with different orientations and expressed differently. This is a field where frameworks and practices remain varied, competing, and contested. The variation goes beyond the issues of ‘different documents with different purposes for different contexts’; even in a single discipline area such as mathematics there exist varied frameworks (O’Keeffe, 2013). Nonetheless, we feel that the frameworks represent a nascent form of ‘science of development and evaluation’ – which is valuable, and capable of further refinement and development.

‘**Craft’ framework 1:**

(Kelley & Clausen-Grace, 2010):

Name of text feature	Purpose of text feature
Title	Quickly tells the reader what information they will learn about
Table of contents	Shows students the different chapter or section titles to and where they are located
Index	Directs students where to go in the text to find specific information on a topic, word, or person
Glossary	Identifies important vocabulary words for students and gives their definitions
Headings or subtitles	Help the reader identify the main idea for that section of text
Sidebars	Are set apart from the main text, (usually located on the side or bottom of the page) and elaborate on a detail mentioned in the text
Pictures and captions	Show an important object or idea from the text
Labelled diagrams	Allow readers to see detailed depictions on an object from the text with labels that teach the important components
Charts and graphs	Represent and show data related to, or elaborate on, something in the main body of text
Maps	Help a reader locate a place in the world that is related to text
Cutaways and cross sections	Help a reader locate a place in the world that is related to text
Inset photos	Can show either a faraway view of something or a close-up shot of minute detail

‘Craft’ framework 2

Rebus community

Structure	Cover page, legal page, table of contents, foreword, unit, chapter, section, sub-section, bibliography, resources, appendices, index, teachers edition materials
Elements	Headings, titles, objectives, overview, introduction, body, graphs, images, tables, maps, sidebar, key terms, vocabulary terms, practice questions, example sets, answer keys, key takeaways, summary, conclusions, case studies, quiz

(Falldin & Lauritsen, 2017)

‘Craft framework’ 3 (mathematics)

Motivational factors	inclusion of historical notes, biographies of scientists and mathematicians, career information, application, and photographs
Comprehension cues	use of colour and graphics
Technical aids	inclusion of material related to use of calculators and computers
Philosophical position	inclusion of material related to use of calculators and computers

(Rivers, 1990)

We need not have stopped at three frameworks. There are many; and this without accessing the editorial writing frames which are used by individual publishers and tech developers. While the

diversity hints at a lack of a systematic approach, there is evidence of some accumulation and synthesis of analysis frameworks (see O'Keeffe, 2013) and systematic empirical derivation of some of the latest frameworks (the State approval of mathematics textbooks for the 'hub' schools in in England used a refined framework derived from analysis of the features of Singaporean and Shanghai textbooks). It is clear that 'quality' remains variously defined. We suggest that more open discussion and review of frameworks are required; accumulation of insight and systematic refinement of these frameworks is possible. We are not arguing for a static or unitary definition of 'quality', since to meet the all-important criterion of 'curriculum coherence', textbooks should be linked to specific discipline requirements, and specific curriculum contexts. But developing the extent frameworks into international 'indicative standards' would seem both possible and desirable.

Reflections

Given the existence of developed theories of learning, understanding of different educational settings and national contexts, identification of 'information elements', we now ideally can link, all within a context of known availability of development funds/market opportunities:

- Educational aims
- Learning models
- Information elements/features
- Control of information elements/features
- Evaluation linking information elements/features to impact
- Optimisation of information elements/features

Despite its scarcity, research of this kind is growing in respect of digital materials, principally driven by a growing recognition that digital reading is not the same cognitive process as reading paper (Lui 2012; Mueller & Oppenheimer 2014; Wolf 2018; Mayer et al 2019). This is helpful, but discourse more generally tends to be dominated by the issue of 'digital versus paper' – polarising and limiting the debate. It is vital to look into the analysis not for correcting the reductivist nature of the 'digital versus paper' issue but for developing and refining a highly sophisticated and practical approach to 'quality'.

Finally, consideration of the full field suggests we can define 'quality' in textbooks as:

'Curriculum coherence' (following Schmidt): the coherent relationship between all internal features of textbooks, and between the textbook and curriculum aims, curriculum content, and pedagogic and didactic practice.

Increasing equity and attainment: the general criteria now emerging in comparative studies of 'educational improvement' in different national settings are 'equity' and 'attainment' – that is, improvement in both, rather than in one at the expense of the other (Hanushek & Wößmann, 2006). If evaluation studies show that specific textbooks are enhancing both attainment and equity, we believe that this represents criteria for the identification and evaluation of 'quality'. Quality resides partly in textbooks which demonstrably improve both equity and attainment.

Decreasing and deconstructing bias and explicit assumptions: despite its never-ending character, cultural critique is essential. It makes overt the implicit assumptions and 'narrative' of specific textbook quality, supports the equity goal, and enables debate and constructive critique regarding assumptions present in textbooks and their role in the reinforcement of unequal power structures.

Consolidation and continuous improvement: the planned cycle of review and improvement of Shanghai and Singapore textbooks leads to careful monitoring of impact, understanding of the relation between information elements and impact, and continuous improvement.

6

Anti-Textbook Ethos

The case against and the 'anti-textbook ethos'

The case for and the case against has now passed into the highly oppositional world of social media comment - some informed by research, much of it not. Among the many commentaries – some negative, some positive - are:

- Why textbooks don't work anymore (New Zealand 2018)
- Textbooks alone are bad for us (India 2017)
- Textbooks are terrible (USA 2018)
- Let's start by burning all the textbooks (USA 2009)
- Where did textbooks go? (England 2017)
- Why textbooks don't work and hurt schools (USA 2012)
- Why you should read that whole textbook right now (USA 2017)
- Why are textbooks bad for education (USA 2013)
- Maths textbooks a textbook case of bad textbooks (USA 2012)
- How Texas inflicts bad textbooks on us (USA 2012)
- Every child should have a textbook (UNESCO 2018)

The debate remains hot, due to issues of the potency of textbooks and materials in curriculum control, funding and purchasing patterns, market capture and links with accountability, and contested issues of curriculum aims and education method. Debate remains hot, but research is sparse. Public policy on textbooks and learning materials thus runs the risk of failing to accumulate scientific understanding of the role, effects and management of materials, and of being buffeted by commentary and public sentiment which is not evidence-based.

We believe that the evidence in favour of high-quality print learning materials is overwhelming, and that the quality of digital materials currently is compromised by excessive supply and ineffective market mechanisms and/or regulation. However, it is essential in this review to consider the contrary evidence, and to consider that fairly.

The empirical evidence that textbooks and related materials are actively damaging is extremely weak. The arguments against high quality textbooks derive from more general arguments in education regarding authority and locus of control regarding curriculum (Lässig, 2009; McNeil, 2002; Young, 1971). In that sense, the narrative against textbooks can be seen as collateral damage from wider educational conflicts.

All of this needs to be considered within the context of variation in the quality and application of textbooks. Our review of studies shows high variation in the form and content of materials, and this operates as a quality variable. Few studies of impact and affect account for the variability of quality - it would be as if a drug trial failed to control the dosage and purity of the drug in question; a very poor method which entirely compromises the evidence from the trial. Indeed, bad textbooks are not desirable; and they certainly exist. The highest quality materials (using our criteria in Cambridge Assessment 2009), used with sound guidance, should be the focus of any investigation of efficacy and value.

A frequently cited study - repeatedly mentioned in contemporary arguments regarding the role of textbooks - is the Glewe, Kremer and Moulin (2009) study: 'Many children left behind? Textbooks and test scores in Kenya'. Benefitting from an RCT design but lacking control of textbook quality, many commentators cite the top line finding that 'textbooks did increase the scores of the best students but had little effect on other students'. Perhaps many readers fail to read the very next sentence in the abstract: '...Textbooks (were) written in English, most students' third language, and many students could not read them effectively....'. The study thus finds: a positive effect for those students who could actually read the books - and 'little effect' for those who could not access the language of the text. Thus, it is unsurprising that the former group showed positive benefit and the latter group did not. To cite this study as general evidence against the use of textbooks is extremely naive. Rather than proof

of the negative impact of textbooks, this study in fact operates as an endorsement of the role of textbooks in educational improvement.

The wider policy context of such studies also is important. In this case, an intervention in a highly diverse, poorly performing education system where an external donor agency possessed a strong commitment to gaining maximum benefit for the expenditure to which they were committing. The intervention in Kenya was itself strongly evidence-based, using prior review studies with a rigorous approach to reviewing evidence - particularly World Bank analysis (Fuller, 1986; Jamison, Searle, Galda, & Heyneman, 1981; Lockheed & Hanushek, 1988).

Heyneman's 1978 paper 'Textbooks and achievement: what we know' was highly influential in steering World Bank policy:

> *...Data are available from twelve countries. Though there were differences in the way these studies were designed, and in the way the data were handled, the importance of books vis-a-vis others school investments appears to be the most consistent school factor in predicting academic achievement. It is positive in 15 of the 18 statistics (83%). This is, for example, more favourable than the 13 of 24 (54%) reported recently for teacher training. The consistency of these positive results does not mean that we know all the reasons why: indeed we do not. Books do not have an impact anywhere near uniform....nevertheless, given the inconsistent results from other pedagogical variables, these findings imply that investments in reading materials hold a distinct advantage when maximising cognitive achievement...* (Heyneman et al., 1978)

Textbook availability and impact analysis was an important strand of World Bank empirical analysis of educational performance, and underpinned the organisation's strategic view that while textbooks may not have uniform impact, they have a consistently positive impact in different settings and indeed sustain a more positive impact in different settings than other tools and interventions. The ***empirical evidence*** of the 1970s and 1980s thus pointed to positive impact and outcomes, while the anti-textbook ethos derives from ***philosophical debate*** within curriculum theory during that same period (Green, 2013; Marsden, 2001) – this we explore later in this section.

The rising interest during the 1970s in textbook impact was stimulated by attempts to support educational reform in the most efficient manner - based on an approach which attempted to differentiate the impact of different interventions (textbooks; or teacher training; or assessment reform) then selecting the invention which appeared to possess the biggest beneficial effect. This early work was not informed by more recent research on 'curriculum coherence' - the notion of the strong inter-relatedness of different factors acting in education systems (W. H. Schmidt & Prawat, 2006). Using this later understanding of the performance of high-performing education systems, our historical analysis of Singapore, Finland, Hong Kong and Shanghai shows that where high quality textbooks are used as a component in elaborated and coherent policy - where there is careful consideration of pupil needs and deliberate and effective links between curriculum, instruction and materials - then benefit also accrues on a systemic basis. The 'curriculum coherence' models allows us to see how curriculum content and specifications, instructional approaches, professional development, and instructional materials together contribute to raising performance and improving equity.

The Kenyan intervention - both in planning and implementation - did not benefit from the insights of 'curriculum coherence'; textbooks were seen in isolation from other features of the system. They were seen as an 'independent good', without consideration of the nature of the pupil population (particularly language facility) or their relationship with other key factors in the system (Fuller & Clarke, 1994). Even then, despite this significant limitation, performance went up amongst the pupils who could access the content of the textbooks: those that could read English.

Yet it is important to note that even in Heyneman's key 1978 World Bank paper on the efficacy of textbooks in raising attainment, there was mention of 'anti-textbook' sentiment - something which surfaces repeatedly now in discussion with teachers and researchers in many modern systems.

By their account, the anti-textbook ethos seems already to have taken hold in the USA prior to the 1970s. In 1978, Heyneman et al. reflected that:

> *...usually the term 'educational 'technology' refers to recent, mechanically sophisticated didactic aids, those produced with large amounts of capital such as radio, television, and computer-assisted instruction. Because the delivery mechanism (not content) was new, they have been thought of as innovative. Not so with textbooks. Using a textbook has frequently been portrayed as pedagogically constraining, and the phrase 'textbook teaching' as though it were pejorative...* (Heyneman et al., 1978, p. 1)

Heyneman notes that textbooks are prone to the trends in 'fashion' in educational theory and practice - a much wider point regarding the 'waves' of poorly-grounded policy reversals which can be observed in many nations:

> *...on occasion less industrialised societies, after a time lag, have been known to follow the educational fashions of wealthy societies. In this instance rediscovering "structure" may come at a convenient time. Less Developed Countries may be able to avoid having textbook investments rejected because they encourage the use of memorization, only to have the use of memorization re-emerge as acceptable pedagogy a decade later. This may save them from wasting time and energy on ambiguous pedagogical assumptions about what constitutes good teaching style...* (Heyneman et al., 1978, 'Use of books and pedagogical style' p. 1 para 4).

With current textbook research in England largely limited to mathematics and language learning, Marsden's 2001 analysis of textbooks in History, Geography and Social Studies provides some insights into the origins and scope of the 'anti-textbook ethos' in England. His work is based on a comprehensive scan of textbook research, but includes an empirical base: interviews with teachers and teacher educators. His summary judgements derive not from superficial assumptions, but from immersion in the field:

> *... 'Textbook bashing' remained a favourite pastime across a broad spectrum of educational opinion...but one which co-existed with a more pragmatic and constructive approach to textbook research...Three types of critical reaction to textbooks can be identified. The first bemoans their presence and campaigns for prohibition. The second accepts their necessity, but demands measures for effecting reform (Patton 1980 p iv; Chambliss and Calfee 1998 p1). In general, a majority of American writers have taken the second stance. In Britain the first has been more evident. The Third and more extreme variant is to ignore the textbook as a subject worthy of serious study, as has also happened in this country* (Marsden, 2001, p. 2).

Marsden's observations on the decline of textbook research in England - and textbook use in school - locate the causes in ideology and philosophy, rather than practical matters of cost, etc. He emphasises that while teachers continued to support the use of textbooks to support learning, teacher trainers seemed to be the location of reaction against textbooks - the origin of the 'anti-textbook ethos':

Writing in 2001, Marsden stated:

> *...textbook research has been given significantly lower priority in Britain then in mainland Europe and North America. Attitudes in educational circles in this country towards textbooks have been more negative than in many other nation, to the extent that an anti-textbook ethos can fairly be postulated. It is important, however, not to take this generalisation too far, and suggest that the ethos is everywhere present and that those who hold it do so equally strongly. It is probably just to surmise that it is more evident among education tutors and advisers than teachers; among primary teachers than secondary teachers; and, in the secondary sphere, among teachers in the humanities than in mathematics and the sciences. Supporting evidence is, however, more easily acquired informally, and often at an anecdotal level, than from the formal literature. Lidstone, for example, recalls that orally he was actively discouraged by university education department tutors from using textbooks during periods of teaching practice, even though experienced teachers in the schools regularly did so...* (Marsden, 2001, p. 55).

Researcher and teacher-trainer John Issitt, writing in 2004 repeated this notion of an 'anti-textbook ethos': '...when I tell my students and colleagues that I study textbooks, tombstones often appear in their eyes expressing painful and buried memories of cramming for exams and repetitious wading through excruciatingly boring pages as directed by teachers who, they felt, could not be bothered to teach the material themselves. On fellow lecturer who was clearly less than sensitive to my sentiments even ventures 'what on earth could be interesting in textbooks?' It would be a mistake to underestimate the challenge of my attempt to elevate the current status of textbook research. The negativity surrounding textbooks in terms of use and status as both literary objects and vehicles for pedagogy is profound. There is a deep-seated 'anti textbook ethos' witnessed throughout the education business. This negative view of textbooks is partly informed by a certain professional defensiveness reflecting a contradictory, almost schizophrenic, sense of the function and cultural worth of textbooks. Whilst as teaching vehicles textbooks are scorned by many in the teaching profession as poor and insufficient and as assuming basically passive learning styles, studies show that they have been extensively used - a fact easily confirmed by examination of school budgets as well as by cursory observation of school and university life:

> *...A further influential driver serving to maintain the negativity surrounding textbooks comes from their low status as a literary genre. They are often scoffed at by academics who feel that they reflect no creative input and that the last thing leading-edge intellectuals engaged in research ought to be doing is formalising yesterday's knowledge for passive consumption by students. Such sentiment reflects a sense of literary elitism that simply ignores the fact that so much learning is done using textbooks. It also reflects the agendas and culture of the research community, driven as it is partly by the research assessment exercise and partly by disciplinary histories the cast discovery and breakthrough as having far more value than careful expository teaching.* (Issitt, 2004, p. 683)

We should perhaps distinguish two elements of the position against textbooks characterised in these descriptions of the 'anti-textbook ethos'. The first element derives from the history of ideas: a general post modernist tenet that 'there is no such thing as definitive knowledge and textbooks offer a single view of knowledge'. The second is linked to views of teacher effectiveness informed by constructivist theory: that teachers are facilitators of the constitution of knowledge by pupils, not engaged in the transmission of knowledge - and use of textbooks represents a defective 'transmission' theory of learning.

We now turn this important issue of historical shifts in curriculum theory and the treatment of knowledge, something which has impacted heavily.

The problem of knowledge

Whilst the importance of 'access to privileged knowledge for all' was central to radical curriculum theory of the 1930s and 1940s, contemporary theory tends to downgrade knowledge in three ways: (i) an expansion of curriculum content to cover skills, dispositions, and values; the so-called 'wider skills' or '21st Century' skills; (ii) asserting that knowledge is 'provisional' in character and constantly is changing; (iii) that the expansion of knowledge means that it is the skills of searching and locating knowledge which are primary and knowledge itself is secondary.

These shifts in views of the status of knowledge pose serious challenge to textbooks and learning materials, since they frequently are characterised principally as 'repositories' of knowledge (Claxton, 2008; Lässig, 2009; McNeil, 2002)).

This general characterisation of textbooks is highly misleading (Cambridge Assessment, 2017; Johnston, 2006; Mili & Winch, 2019; Oates, 2010). Close systematic analysis of textbook content reveals that they do not always consist simply as a presentation of knowledge, nor do they always encourage a passive approach to learning (Slamet et al., 2019; Umugwaneza, 2015).

They can include requirements and recommendations for actions to be undertaken by learners - observation, collaboration with others, productive activities, critical thinking and analysis (Marsden, 2001; O'Keeffe, 2013). They can provide questions which both encourage enquiry and thought, and provide feedback on performance and attainment which stimulates reflection and further learning (Cambridge Assessment 2016).

But this 'problem of knowledge' remains strongly associated with textbooks.

On expansion of curriculum content to cover skills, dispositions and values - the wider skills or '21st Century Skills'. The expansion of theory around the 'desirable outcomes of learning' - extending it beyond the acquisition of subject discipline knowledge - is strongly influencing curriculum theory and curriculum reform around the world. This has figured - albeit to different in revision of the Singapore National Curriculum (2002); the Scottish 'Curriculum for Excellence' (2010); the new Kenyan National Curriculum (2018); the revised curriculum for Wales (2020); the Australian ACARA curriculum specification (2022 implementation) and the OECD 2030 Curriculum Framework. Although not necessarily intended by organisations and researchers advocating a widening of curriculum specifications to include skills, dispositions and values, two tendencies are present: (i) a 'displacement effect', where the need to include things other than knowledge has reduced the emphasis on the specification of knowledge in curricula (Oates, 2010; World Bank, 2019) (ii) a 'legitimacy effect', where the justification for the inclusion of skills, knowledge and dispositions has been perceived as a rejection of subject discipline knowledge (Oates, 2010).

In Primary and Lower Secondary education, textbooks have been caught in the acrimonious exchanges about these new approaches to curriculum. There has been considerable rhetoric that a focus on knowledge is traditional and antiquated, and a focus on skills, values and dispositions is modern and progressive (OECD, 2019b).

Within this, textbooks and the use of textbooks have been seen as 'traditional and outmoded' while local materials development by teachers and use of on-line resources has been seen as 'modern and progressive' (Oates, 2014). But this highly polarised debate misrepresents the history of curriculum development – for example, it is important to emphasise that social capital and personal capital (values and dispositions) have long been seen as 'general goods' of liberal education, alongside development of core knowledge (Helve & Bynner, 2007; Tapper & Salter, 1978). What IS new is including these 'general goods' more explicitly in the detailed specification of national curricula, using highly specific descriptors which previously were used for grade- or year-based statements of subject discipline content. Some of the curriculum reforms - such as the revisions in Scotland and Kenya - have emphasised complex approaches to cross-curriculum delivery, and emphasised classroom-level curriculum development - at odds with materials which provide structured approaches to delivery of learning programmes, and include pre-determined contexts, examples, illustrations and activities.

This then links to the ‘legitimacy effect’ where textbooks are part of an ‘earlier education world’, and where structured presentation of material, and high levels of curation of subject content is seen as antiquated.

The marginalisation of subject discipline knowledge has been driven by a second key feature of educational thinking of the past few decades: the assertion that knowledge is ‘provisional’ in character and is constantly changing and so cannot be presented as ‘authority’; and accompanied on occasion by criticism of the ‘value-laden’ nature of knowledge (Green, 2013; Lyotard, 1984). This has featured strongly in contemporary educational thought (Marsden, 2001). Again, in the light of particular representations of these assertions, textbooks have been viewed negatively as ‘single points of authority’, and thus outmoded in terms of contemporary epistemology.

This review is not the place in which to explore these issues in detail; it is perhaps sufficient to state that, all too frequently, these assertions are based on faulty understandings of principle; misunderstandings of contemporary philosophical thought (Bhaskar, 1975; Dawkins, 1998) but also confusions around practicalities; particularly regarding the history of the development of knowledge (Cambridge Assessment, 2017). We will look at both of these in more detail.

Addressing the issues of principle, Michael Young clearly delineates the importance of enduring ‘powerful knowledge’, which is not acquired by young people naturally or swiftly, and its availability through formal education is both important for individual cognitive development and for social equity (Young, Lambert, Roberts, & Roberts, 2014). Also at the level of principle, Critical Realist analysis shows that forms of knowledge vary across the natural and social realms, and that strict criteria can be used to identify theory and explanations which qualify as ‘powerful knowledge’ (Bhaskar, 1975).

On the contingent issue of practicalities, critics argue that human knowledge changes so rapidly that textbooks cannot possibly ‘keep up’. But this fails to recognise that while human knowledge is expanding extremely swiftly, paradigm shifts in the fundamental elements of disciplines occur infrequently in all major disciplines. For example, whilst bio-medical work based on human genomics brings daily development in therapies, genetic theory was initially laid down in the 1930s, and the structure of DNA was identified in the 1950s. The last major paradigm shift in physical geography was plate tectonics in the 1960s. The electron was discovered in 1897, while quantum physics arose with Bohr and Heisenberg’s work in the 1920s. This is not limited to science. Minimalist music originated in America in the early 1960s, while conceptual art traces to the Stieglitz’s photograph of Duchamp’s ‘Fountain’ in 1917. Schelling’s concept of ‘the unconscious’ was popularised through Freud’s work in Vienna in the early 1890’s. Applications and refinements of these fundamentals of course constantly constant and rapid expansion of human knowledge, but are applications and contextualisation of these fundamentals. It is this foundational knowledge which is essential and, as Oates (2010) and Young et al. (op cit) make clear, should be the focus of Primary and Secondary education. Fundamental knowledge is provisional and does change, but not in the manner or at the pace suggested but those that criticise textbooks in principle.

This analysis does not imply that some textbooks and learning material can’t be factually wrong, limited, over-assertive, partisan, and inadequate. That is entirely possible and does occur. But the post-modern position of criticising textbooks on the basis that they represent a flawed model of human knowledge is ill-founded. Rather, the reverse is true.

It may seem fanciful to link practical issue of perceptions of the role of textbooks to grand philosophical thinking regarding the status of knowledge, but the link is there:

> *...while we are unlikely to hear teachers quoting Derrida and Foucault in the classroom, the shift in ideas brought about by postmodern thinking may well result in teachers raising questions about power, knowledge identity and language in relation to their own work...* (Atkinson, 2000, p. 94).

And Marsden again:

> *...Post-modernism has inexorably infiltrated the thinking of educationalists. Some post-modernists writers have recycled the long criticised linkage of subject-centred approaches with traditional textbooks, and this in turn with an outmoded 'modernist' agenda of 'subject aggrandisement' (Edwards 1996 p. 222). In Britain and the United States therefore, a simplistically polarised coupling of 'modernism' with anachronism, and 'post-modernism' with progressivism, has emerged, even though child-centred approaches, as noted above, can be traced back at least to the late eighteenth century...* (Marsden, 2001, p. 65)

On the assertion that the expansion of knowledge means that it is the skills of searching and locating knowledge which are primary and knowledge itself is secondary, this commits an error in the realm of psychological theory rather than epistemological theory. While it is true that the digital revolution has transformed the way in which expressed human knowledge is curated, the ability to see things, find things and discriminate between things is determined by the specific concepts and knowledge held by individuals in long term memory: the schemas they have constructed - their 'personal capital' which they carry forward into new activities (Berzonsky, 2010; Meeus et al., 1999).

These are the very stuff of cognition. Whilst the skills of searching are indeed vital skills, human activity and development in no way reduces the ability to search for things in the virtual world. Without elaborated constructs, nothing would be recognised as significant, nothing could be compared, and nothing could be evaluated. These constructs – held and developed in the mind - derive from the rich mixture of subject disciplines and the practical enquiry associated with them. The level of direction needed for effective learning, with careful curation of knowledge and presentation of both concepts and application is reinforced by current empirical research: '...controlled experiments almost uniformly indicate that when dealing with novel information, learners should be explicitly shown what to do and how to do it...' (Kirschner et al., 2006, p. 79).

This brings us to the criticism of textbooks regarding 'passive learning' and the notion that textbooks necessarily invoke a 'transmission' model of learning. We deal with this at greater length elsewhere in this review. Texts, lectures and blogs criticising textbooks most often set up a caricature of their use: dry lessons in which the teacher defers to the textbook and pays little attention to the needs and interest of learners (Ewing, 2004; Polos, 1964).

But whilst possible and observable in some setting, this has become a caricature (Mili & Winch, 2019). Whilst bad teaching can occur, it is not limited to that in which textbooks are involved (OECD, 2019a), nor is there a shortage of national systems and specific classrooms in which textbooks are used as part of high quality, sensitive and highly effective pedagogy and didactics (Cambridge Assessment, 2017). This is particularly obvious where textbooks encourage higher order thinking, challenging tasks, and varied application (Knight, 2015; Oates, 2018). The challenge here should be to naive constructivist criticism of textbooks and learning materials, which frequently make teachers feel inadequate if they have not designed resources themselves (Christodoulou, 2014).

Educational theorists who have argued cogently for the enacted curriculum being a complex process of formation by teachers in individual classrooms, designing and managing activities tailored to the needs of specific groups of learners and being dynamic and responsive (Marshall & Wiliam, 2006; McKernan, 2007) do not suggest that textbooks should NOT be used. They see high quality materials as part of the instruments which skilled and competent teachers can utilise and deploy.

Implicit in the assumptions of much of naive constructivist critique of textbooks is that the textbooks have not arisen from effective practice. But in places such as Singapore, Japan and Shanghai, the content of textbooks derive from sophisticated learning models and systematic lesson study (Cambridge Assessment, 2017; Oates, 2014). When this is the case, they operate as an important mechanism for the dissemination of good practice.

The final key element of 'the case against' centres on issues of curriculum control. Schmidt's 'curriculum coherence' analysis shows through empirical study the importance of the links between instruction, curriculum aims and content, and learning materials. His analysis examines not only the

role of curriculum coherence but also the means by which it is obtained in given educational systems. He argues that the form of control, which gives rise to curriculum coherence, vary in different national settings (W. H. Schmidt & Prawat, 2006). However, despite the variation in forms of control (negotiated, top down, brokered, etc.) the need for control - restriction, approval, etc. - is present.

Our previous curriculum analysis reinforces Schmidt's analysis: that textbooks and related learning materials have a potent role in the enactment of national curricula, support and encourage high quality pedagogy and didactics, and thus contribute to the realisation of ambitious curriculum aims (Schmidt & Prawat, 2006; Schmidt, Houang, & Cogan, 2002). They frequently are essential in complementing generic and generally-stated content of a national curriculum by providing detail of instructional activities, curation of knowledge, phased progression through material, formative and summative assessment and so on. If national curricula tend towards statement of standards and outcomes, textbooks aligned to the aims and content of the curriculum provide the next important level of specification of the content and processes of the curriculum (Schmidt et al., 2002).

The very potency of textbooks and materials in ensuring coherence around aims, content and instructional methods thus makes them an instrument of curriculum control. Where the coherence and content of education enjoys high levels of consensus and public support, textbooks are seen as delivering public goods (Mattiasson, 2019). Where coherence and control is contested, their role as an instrument of control makes them an object of criticism. This is evident in England, where in general education they are strongly associated with public examinations at the ages of 16 and 18, and those qualifications are strongly associated with school accountability arrangements (Department for Education, 2019).

Interestingly, interviews in Latvia showed how policy makers opposed the use of textbooks and textbook policy as part of the policy instruments in the enactment of the new national curriculum, since textbook use was a key part of the Soviet education system during occupation. Rejection of textbooks within the education system was therefore associated with rejection of a previous education system, which itself was associated with diktat and political apparat. Again, we see unhelpful confusions between the qualities of textbooks as effective curriculum instruments and specific, contingent conditions.

Reflections

We acknowledge specific limitations of some textbooks and materials - inappropriate value-base in specific texts, poor pedagogic and didactic models. We explore these in more detail in the section on quality. We also acknowledge examples of 'lock in' and 'commercial capture', where market arrangements allow monopolistic or restrictive action by publishers themselves – this is explored in the section on governance. This was evident in our study of some South East Asian nations, where publishers had sufficient commercial capture to prevent legitimate curriculum reform.

We contend that issues of quality and effectiveness are essentially contingent issues of the way in which textbooks are designed, produced and used. Low quality textbooks exist, other aspects of education can overdetermine outcomes, and markets and arrangements can be poorly structured. But these are contingent, not necessary states of affairs. Carefully constructed public policy, application of evidence-based quality criteria and well-trained professionals feature in systems where textbooks have played a role in sustained improvement. These examples of high-quality textbooks in effective systems highlight how textbooks carry important functions in educational arrangements - and signal the possibility of high quality, effective contribution to equity and attainment, and effective contribution to realisation of curriculum aims.

7

Governance

Governance and approval processes

In considering approval and governance processes for textbooks and related materials, we need to return to the issue of false presentations of 'old, traditional' versus 'new, modern' which we have examined earlier in this review. While digital allows processes which are not possible with paper (embedded links, video, simulations and animations etc.), they both include organisation of curated knowledge, expression of underlying learning models (extended practice, comparison and contrasted presentation, sequencing of material, assessment and feedback etc.), and structured support to learners and teachers. Our functional and structural analysis of materials suggests that high quality digital and high quality paper materials share more common principles than commonly assumed. Both, designed and deployed well, can achieve the key aims of modern educational policy: enhancement both of attainment and of equity.

Under analysis of function and impact, the stereotype 'textbooks old – digital new' begins to break down. But the association of paper textbooks with 'old curriculum thinking' occurs time and time again in commentary on educational reform (Daily Mail, 2015; Inspiration Education, 2018; Ross, 2015).

The contrast of Estonia and England is salutary. In England, the new coalition Government of 2010 seriously questioned the direction of travel of previous reform of the National Curriculum, and reasserted the importance of 'powerful knowledge' in the revised curriculum developed 2010-2013. In the drive to higher levels of early literacy and mathematical attainment, they introduced central approval of learning materials. In 2014, noted the decline of the use of textbooks and he existence of a strong 'anti-textbook ethos', the government strongly advocated the role of high quality textbooks and learning materials, entering into detailed discussions of strategy and market structures with leading publishers. All of this tended to be characterised by critical commentators as backward looking and knowledge based (Alexander, 2012; Bassey & Wrigley, 2013), despite the roots of the policy in sophisticated contemporary transnational analysis (Oates, 2010). Policy in England has anything but failed; performance in key international surveys has improved. Notably, in maths and reading, where approved materials have featured in policy, standards have improved either in absolute or relative terms. Maths has improved, while reading has only increased marginally. But since many other nations have experienced a serious decline in attainment, the marginal improvement represents considerable relative improvement (Oates, 2021).

In science, where no special improvement policy has been launched, and no materials strategy developed, performance is moribund. But in other domains, the improvements since 2010 are there, and impressive. Enter the contrast with Estonia. Estonia has been praised for its high attainment and period of improvement (Butrymowicz, 2016; OECD, 2016).
In addition, its reform processes have been characterised as embodying new and progressive commitment to 'competence-based curriculum theory' (Tire, 2021).

We perhaps therefore should expect two things: a strong contrast between the curriculum content and learning models of the two national curricula, and where there is promotion of the use of textbooks in England, we should perhaps expect to find the rejection of textbooks in Estonia. But detailed analysis shows neither of these things. Firstly, curriculum content and learning models (for example the emphasis on memorisation and practice) is extraordinarily aligned in key subjects – particularly in mathematics (Kärner et al., 2013). Secondly, while increased textbook use and new centralised materials approval processes have been introduced in England, textbook use is extensive and strongly embedded in the Estonian system (Lepik, 2015).

Elements of 'old-new' rhetorical dichotomies seem therefore to be ill-founded and misleading (Oates, in press).

This is not to say that radical new approaches to stating national curricula are not being developed. They are. The 2008 National Curriculum in England – abandoned and overturned by the revised 2014 curriculum – introduced extensive skills-based elements and reduced the statement of powerful discipline knowledge to highly-compacted generic statements (Oates, 2010). Introduced in 2010, the

‘Curriculum for Excellence’ in Scotland has emphasised the features of learning experiences over substantive cognitive outcomes – currently with declining standards in successive PISA cycles (Oates, 2021; Priestley & Shapira, 2019). France has instituted ‘competence-based reforms’. Kenya and other African states have moved in the direction of ‘competence statements’ as the basis for their national curricula (Ruth & Ramadas, 2019), while OECD’s ‘curriculum 2030’ initiative strongly embraces models associated with ‘competence-based curriculum theory’ (Anderson-Levitt, 2017).

Yet while the merits of ‘the new competence-based curriculum approach’ is championed in international commentary about the curriculum, no strong evidence on its efficacy is available. What IS available is evidence from periods of improvement around the world, including periods about which we have empirical evidence for substantial improvement in both attainment and equity. These give a different perspective to rhetoric regarding educational improvement and role of textbooks. These periods and nations include: Finland during the 1970 and 1980s – its improvement stalled in 2000 and attainment and equity have declined since that point. Singapore from the 1940s to the present day. England since 2010, with a long period of minor improvement followed by stagnation during the 1990s despite substantial investment, followed by and revised approaches to curriculum and assessment from 2010, reflected in significant improvement in attainment and equity. Of importance for this review, from 2010 onwards, state approved reading materials schemes have been in place for reading and early mathematics, focussing school activity on evidence-based approaches to teaching and assessment. Portugal in the early 2000s, following a focus on national assessment, clear standards and high quality curriculum materials. Massachusetts during the 1990s, elevating attainment but not equity, following its emphasis on specification of clear and coherent educational standards, high quality curriculum-linked materials and professional development. Of high relevance to this review of the role of textbooks and educational materials both Finnish and Estonian teachers continue to use textbooks and related educational materials for structure and content of teaching and learning particularly in, but not limited to, mathematics (Lepik, Grevholm, & Viholainen, 2015; van den Ham & Heinze, 2018).

Our scrutiny of proven times of educational improvement (Oates, 2010) suggests that reform and textbook governance is intimately connected. Yet research on this is limited. The scant research on the patterns of approval and selection note the rapidly changing patterns of textbook approval and choice, with an overall reduction in tight prescription by states, and an increase in ‘micro-decisions’ by teachers regarding resources:

> *In countries where teachers may choose their own textbooks they traditionally select a new series once every 5 to 10 years. Since the introduction of educational media have gradually changed. Digital learning environments offer teachers the possibility of bringing in their own content and this means that teachers nowadays have to decide sometimes several times a day which content to use with students; be it a you tube (sic) video, a piece of text, a rehearsal program, a game, a textbook chapter, etc…* (Reints & Wilkens, 2019, p. 99).

Whilst this research is interested in the precise locus of control, it is vital to note that it retains a sense that these choices by teachers occur in an overall context conditioned by the state – e.g. retention of state approval versus liberalisation of markets, patterns of funding etc. But in presenting research on locus of control (who makes the decisions and how) and the overall policy context (structure of markets), this analysis omits something which analysis of Finland shows to be very important: the echo of previous policy in contemporary practices.

We thus draw on the following key categories for our analysis here:

Locus of control
Who makes decisions about which resources, and about the content of those resources

Climate
Policy, practice and values: attitudes towards textbooks and related materials, and patterns of use

Legacy
Conditioning of contemporary materials and practice by past policy and practice

This last and very important category comes from the close analysis of the situation in Finland (Wilkens, 2012).

Wilkens states in her typography of forms of control that Finland does not have state approval of textbooks. However, this is misleading when it comes to understanding how and why the current textbooks are the way they are, and the patterns of use. Our interviews with Finnish educators and publishers makes clear that while State approval ceased in the early 1990's, the expectations and quality criteria set up in the system during the 1980s and 1990s heavily conditioned the approach to textbooks production in terms of curriculum coherence: (i) learning models; (ii) structure and content; (iii) production processes. During the post-68 reforms, the reform of textbooks was seen as essential. They were redeveloped and aligned to the revised curriculum, and viewed as a major means of establishing very new approaches to teaching, not just a means of establishing new content. The new curriculum model and philosophy shifted the whole system from selective to comprehensive education, and textbooks were designed to reflect and support pedagogy and didactics which realised that ambitious aim. The emphasis in the materials was maximum accessibility to curriculum content, for all pupils. The state approval process, commissioned and operated under the management of the National Board of Education was powerful and deeply influenced the form and content of the texts. The materials were universally accepted and gained very high levels of support amongst municipalities and teachers. The central approval processes ran throughout the reform period, ceasing in the early '90s. It is true that it ceased. But its effects did not. The form and structure – and high quality – of the textbooks and materials had been established and a culture of high quality put in place. The approved textbooks operated as exemplars and models for the textbooks which continue in the system, and which continue to be produced. The statistics on use bear out the commitment the high levels of use of materials and to the teachers views from interview that '..Finnish education is good because of two things: good teachers and good materials…' (interview with Finnish teachers, Faculty of Education Cambridge April 2009)

Mother tongue and literature: 85% report 'using rather extensively or very extensively' (Tainio, 2012)

Mathematics: 90% use textbooks for tasks in every lesson, and as the only source for homework tasks (Lepik et al., 2015)

Science: 94% report using 'textbooks as a basis for instruction' (Martin et al., 2012)

Things are changing in Finland regarding the shift from paper to digital. The recent descriptions of increasing use of digital educational resources in Finland appear to overemphasise the actual levels of use outside the large urban areas. In 2012, use of educational technology lagged well behind other EU countries, with Finland figuring amongst lowest scoring EU nations in a series of both student and teacher measures (European Schoolnet, 2012).

More recently, Aino Saarinen's empirical work on various aspects of curriculum innovation in Finland showed that '…the more that digital tools were used in lessons, the worse learning outcomes were. This was found in all areas of the PISA measurements…' (Uutiset, 2018). The detail of her findings are important:

> *Frequent use of self-directed teaching practices or digital learning materials at school were associated with students' weaker learning outcomes in several knowledge domains. Instead,*

frequent teacher-directed practices were related to students' higher learning outcomes. Moreover, frequent use of self-directed teaching practices or digital learning materials had more negative impact on students' learning outcomes in students with (vs. without) risky background. Additionally, participation in ECEC before preschool was not associated with learning outcomes at 15 years of age. This association was not significantly moderated by parental socioeconomic status (as measured with the index of ESCS). At a trend level, the impact of participation in ECEC before preschool was slightly more positive for offspring of parents with high (vs. low) socioeconomic status.

In conclusion, some pedagogical practices within the school system, such as frequent use of self-directed learning practices or digital learning material, were found to increase variance in learning outcomes between students coming from different backgrounds in Finland. No evidence was found that participation in ECEC would be related to learning outcomes at 15 years of age or would increase equality between students coming from different family backgrounds.

(Saarinen, 2020, p. 101)

The tight centralist model of curriculum control which was central to educational reform of the 1980s and 1990s – and demonstrated in the textbook approval processes – was replaced by a period of relaxation and 'governing autonomy' (Saari & Säntti, 2017), increasing the apparent autonomy of school principals and municipalities. With policy focussing on increasing the use of digital technologies in schools, interesting shifts in locus of control are occurring:

> *…one could conclude that Finland has…succeeded because of the meagre use of ICT in their teaching and the low levels of digitization…there are prominent developments that have taken place in the last few years that deviate from the recent strategy of governing autonomy in Finnish digitization policies. First of all, the new national curriculum for comprehensive schools now dictates the digital technology should be used in every school subject. This has lead boards of education in some cities and municipalities…to plan strict quotas on the use of digital technologies in comprehensive and upper secondary school subjects. Thus it is rather ironic that the Finnish rhetoric that hails autonomous principals and teachers may now be coupled with some strict norms that school leaders and teaching staff are obliged to follow…* (Saari & Säntti, 2017, p. 457).

Concepts of 'curriculum control' are extremely important in interpreting these events. The Finnish approval processes for textbooks in the 1980s and 1990s were extremely restrictive, affecting content (curriculum alignment), formatting (for example use of images), and learning models (the drive to fully comprehensive learning and the progression of each and every child). The textbook approval processes – still only one of a series of measures during the first decade of reform - conformed to Bill Schmidt's concept to 'curriculum control which assures curriculum coherence' – alignment of curriculum aims, curriculum content, learning materials, and teacher practices. Schmidt's analysis makes clear that curriculum coherence can be obtained by different aspects of educational policy and through different forms and models of control (top down; negotiated; participative etc.). By contrast with the tight restriction of textbooks of the 1980s and 1990s, the escalating contemporary restriction around digital materials relates to levels of use in subjects, not modes of use, models of learning or content. 'Curriculum control' in respect of digital materials is not being exercised in the same manner or to the same depth as was the case with textbooks forty years earlier. This may in part explain Saarinen's findings (2020) regarding deleterious impact of the use of digital resources in Finland. Educational policy and practice in the nation may not have yet identified the means by which quality of materials can be assured nor the practices in the classroom (and home) which ensure the pedagogical symbiosis emphasised in Remillard and Taton's crucial overview of the function of high quality materials: '…Through making sense of and planning with curriculum guides, teachers immerse themselves in a partnership with the authors – a partnership to which both members contribute in mutual and complementary ways…' (Remillard & Taton, 2016, p. 4).

Saarinen's findings could be presented as a simple 'anti-digital' argument. But this is too simplistic. An explanation of her findings must include issue of practice – as above – but also issues of choice, quality and supply. Locus of control is essential: supply patterns and choice of materials must be considered when examining what materials are deployed in specific settings. For public policy, this

can be stated simply: if curriculum control is necessary to deliver curriculum coherence, and thus improvement in attainment and equity, what forms of governance are needed to ensure a supply of high-quality materials? What market forms do we see around the world, and should degree of market structuring should be put in place by the state?

The literature on market structures for school level materials is extremely underdeveloped. By contrast, the commentary and analysis on the structure of markets in textbooks in the US university sector is extensive – this is due to the public prominence of problems created by the high cost of texts. The existence of a strong second-hand book market erodes publishers' profits. While the second-hand market provides a benefit to individuals, it induces pressures on suppliers, who require investment to sustain operations and commission revised texts. Textbook prices have increased well above normal inflation, as publishers seek to sustain income (Senack, 2014). Book rental, rather than purchase, became established in the USA (Benson-Armer et al., 2014; Mattiasson, 2019), but the continued drive to sustain revenues caused rental prices to rise to nearly the price of purchase copies, thus re-fuelling the second-hand market. Recent switches from digital to paper may be surrounded by claims of 'modernisation' but it has a fundamental market rationale beneath the surface discourse: it enables access to be purchased, and then closed down, with the aim of stifling the previously vibrant second-hand market (Mattiasson, 2019).

The market structure of textbooks in higher education has attracted the attention of academic researchers – probably though a mix of intellectual curiosity, their proximity to events, and potential pecuniary interest in the market. But the research is extremely helpful, since it provides a framework for the analysis of the structure and supply of school textbooks and learning materials. We discuss further aspects of the impact of market forces on textbook production and textbook authors in Section 8.

The literature theorises the supply of knowledge as a public good. In the Second International Textbook Summit (Iceland 2019) the theory used to explain the behaviour of the US higher education textbook market was summarised as follows:

> *…The knowledge contained and distributed through textbooks requires adequate description regarding its form, value and function. The value of knowledge is not reduced as consumption increases - it is a non-rivalry good in its consumption. It is hard to restrict access once knowledge has been created and initially distributed - the plot of a play, historical events etc. - non-exclusion characterises such a good. Goods with these characteristics are classed as 'public goods' or 'club goods'. The knowledge itself can be characterised as a 'public good' but since there are instruments and processes of distribution and communication which affect its distribution in human populations, there arise paradoxes, contradictions and conflicts. The qualities of a pure public good enters into interaction with the qualities of a private good. This immediately can be seen in the cost increase of textbooks over time.*
>
> *Key issues of commodification of the distribution of knowledge, the areas of demand structure (what schools, parents and pupils are asking for) and commodification of knowledge production around pedagogy (unique features of material which enhance specific materials) should be considered. The state's role in conditioning and structuring demand should not be underestimated…*

(Menntamalastofnun & Cambridge Assessment, 2019, p. 11)

One key element in this analysis is the issue of private and public goods. Mexico's presentation to the First International Textbook Summit emphasised how simply opening up the access for schools and pupils to ANY textbook was a priority in the nation; the funding and approval system was thus incredibly open and permissive, with huge lists of publishers from which schools could choose. The specific conceptualisation of perceived public good is extremely clear in this example (Mattiasson, 2019) – knowledge is seen as an open public good, and the policy maximises availability, but without attention to the quality of individual textbooks. This contrasts strongly with the policies of approval and restriction, such as Finland in the 1980s and 1900s and England post-2010 where very tight criteria exist regarding format, content, curriculum alignment and learning model.

Those countries which allow access to market for private publishers who pass approval hurdles essentially can enter into a dependency on private providers, who operate as an agent to deliver agreed public goods. An issue neglected in the research on these arrangements is the question of sustainable supply. The costs of production of high quality textbooks is high, the production of high quality digital resources is even more so (Ghirardini, 2011; TrainingZone, 2003; Wildi-Yune & Cordero, 2015).

Surplus needs to be present in arrangements if long term relationships with private providers are to be sustained. For the Icelandic government, it was a shock to discover, in the open exchanges of an international policy summit, that key private publishers heavily subsidise their high-quality schoolbooks from fragile non-textbook sales – a serious threat to sustained supply, of which the State was unaware. Singapore and Hong Kong both are interesting in respect of dependent relations, with arrangements which allow choice and avoidance of monopolistic tendencies (through multiple suppliers) market discipline (through tendering processes) and quality control (through state approval and state R&D on approval criteria). England typically has been a low-restriction and permissive system, yet tight tie-in between specific publishers and specific examinations at 16 and 18, which has presented schools with semi-monopolistic arrangements operating discreetly in the system. In addition, the rapid and repeated revision of national qualifications has led to compromised development and production, eroding teacher confidence. The prevalence of the anti-textbook ethos in the UK has led to a collapse of sales in non-assessment-linked titles, and a decay in the ability of teachers to make discriminating purchasing decisions. While committed to quality and to self-organisation in the face of market decline, publishers know that they are faced with a tough and imperfect set of market relations. In this context and state of market structure, simple appeal to self-organisation on publishers' behalf was considered possible, but appears not to have delivered the improvement in quality and demand desired by the pro-textbook post-2010 administration. At the current time, the Government's desire to have tightly linked curriculum materials, which embody well-theorised learning models and text features, has led to the competitive commissioning of school-devised materials, which are then made available to all schools. Publishers' reactions have tended towards strong criticism, feeling that this further erodes the market. Whereas the Government sees its actions not only as short-term provision of high-quality materials, but as a general long-term stimulus to schools for the purchasing of high quality materials. Time will tell.

Poland represents an extraordinary example of a rapid shift in state management of relations; in the Second International Textbook Summit, Robert Kuc's (2019) analysis of the unfolding situation in Poland reveals the complex impact of rapid and forced realignment of market relations.

We reproduce here in full the analysis presented at the Second International Textbook Summit:

Government versus educational publishers: the changes of the paradigm in Poland (Robert Kuc, 2019)

> *Poland is an important case study, due to the fundamental changes which have occurred in textbook policy and market structures. It is not clear that the shift in paradigm has improved the sustainable supply of high quality materials – indeed the reverse appears to have occurred. In swift sequence, the arrangements to 2014 were based on a free market in supply (but with the coherence of alignment to a national curriculum), moving in 2014 under a new government to the State as publisher, to a new 'hybrid' model of a regulated market from 2017.*
>
> *Following the end of Communist rule in 1989, Poland has enjoyed both economic and educational success. In 2018, economic growth stood at 5.1% and unemployment at a low 3.8%. But the changes in textbook paradigm has had a big impact on market structure. The market for books in Poland stood at 700M euros in 2014, with the school textbook market at 220M euros. Purchasing principally was by parents, with complaints that the cost of 60-120 euros per year per child was too high a cost. Growing concerns amongst parents perhaps inevitably led to political parties assuming a deliberate position on the market and costs. Government also was concerned about disparities in purchasing power between social groups and regions. With restrictive policy implemented in 2014, publishers were adversely affected by the move to State purchasing and provision – a number of publishers filed for*

bankruptcy and others immediately moved to the development of new markets. The change cycle has been rapid, and the nature of structural reform profound. For example, leading publisher WSiP originally was owned by the Polish Treasury. In 2010 it was sold by the Polish Treasury to an American-based private equity firm. As a result of the 2014 changes, the owners in 2016 looked to sell the company and exit the Polish market. This period of market contraction saw short term improvement in conditions for large publishers, and considerable consolidation.

Distribution patterns shifted; less turnover in the traditional parent-purchasing market placed great pressure on small and medium sized bookshops, many of which closed; 1400 bookshops closed, with 400 remaining. The distribution problems favoured larger distributors. Municipalities' preference for single invoicing for each school again fuelled consolidation.

In 2015-6, the Government undertook further policy revision, proposing a move to exclusively digital content, with the Government co-ordinating the development process for e-books aligned to the national curriculum.

Poland is traditionally a system in which textbooks are used extensively, and from the 1990s to 2014 saw both significant increase in public expenditure on education and significant improvement in participation and achievement – a rate of improvement well above the OECD average.

From 2014, the number of textbooks available for schools dropped, but use remained high – with nearly 100% of schools using the Government-co-ordinated textbooks. In 2015 the Government discontinued the textbook programme, moving to providing financial assistance to parents' purchasing of textbooks.

The book market dropped from 220M euros in 2014 to 133M in 2018, a 40% reduction. This has adversely affected the development investment and future of specific providers, leading to concerns about quality and sustainable supply. Just as international research on quality criteria has increased, capacity to capitalize on the insights from this has reduced.

The phases can be summarized as follows:

Prior to 2014:
Low regulation of markets, but with structural co-ordination to ensure coherence, parental purchasing and ownership. The State sets criteria and curriculum specification; appoints approval experts, approves textbooks. Publishers apply for paid State approval; promote approved titles to schools; provide books for distributors; provide free professional development. Teachers select textbooks from approved lists; attend free professional development Parents pay for books and workbooks in all education phases; own the books 2014:

Market restructuring with State as producer in lower primary, State funding textbook purchasing in all phases, municipality ownership of books. The State sets criteria and approves books, and becomes publisher with no approval in lower primary. Publishers operate within price caps/limits for upper primary and lower secondary and within a new three year purchasing cycle. Teachers in lower primary select books from State, or from publishers in other phases; select additional exercise materials; selections approved by head teachers and municipalities. Parents do not pay for books and books are owned by municipalities. Workbook use declined absolutely.

2017:
Further market restructuring, with publishers again able to offer books in lower primary. Price caps operating in first 8 years of schooling. Free market again established in upper 4-5 years of vocational and general schooling.

While purchasing pressures have been reduced on parents, the set of changes have dramatically impacted providers, distributors and school practices. The distribution changes

have closed 80 percent of small books. Workbooks have been almost completely removed from the primary phase. Specialist publishers, focusing on single subjects have declined significantly. The market has favoured larger providers and promoted deep consolidation. The reduction in distribution channels and the structure of the market may create conditions for larger global enterprise to dominate arrangements.

(Menntamalastofnun & Cambridge Assessment, 2020, pp. 9-11)

Further examples from transnational comparisons further illuminate the issues on market dynamics and governance:

Azerbaijan
Azerbaijan represents an interesting case study of governance over textbook revision following the government's efforts to create a clear break with the former Soviet regime and the educational materials associated with it. In the period of post-communist transformation, textbook revision emerged as one of the key priorities of education reform in Azerbaijan. International sponsorship of education reform played a key role and the partnership between government, international financial institutions (particularly the World Bank) and NGOs had a tremendous impact on textbook-publishing reform in the country (Kazimzade, 2008). Despite the government's acceptance of market liberalisation principles – allowing for example the tendering of textbooks and competition (at least theoretically) among publishers – a difference between intentions and outcomes of textbook reform in Azerbaijan was clearly noticeable. On the one hand, Kazimzade (2008) attributes this discrepancy to the government's caution about losing control over ideological debates in education as it navigated its new role in a free-market environment. In addition, while textbook quality was generally regarded as a priority of the reforms, little was done in practice in terms of mechanisms put in place to ensure quality. Quality standards for design and pedagogy were not clearly specified, for instance, in government tender documents; meanwhile, the creation of an independent Textbook Approval Board in 2006, with its own procedures for evaluation, selection approval, and procurement, saw a long delay in books being put through the Board's mechanism. Finally, the relative lack of consumer influence in the publishing and quality control process, related to the absence of decision-making capacity provided to schools or parents, has meant that a key quality control mechanism of consumer choice was also limited. As Kazimzade (2008) summarises:
'In practice, the varying and often conflicting interests of different partners have led to selective implementation of reform. This has sacrificed the principles of choice and quality – promoted by OSIAF and the World Bank – for the control of textbook publishing – desired by the government.' (Kazimzade, 2008, p. 116)

Latvia
The locus of control issues are fascinating in Latvia. Undertaking a radical overhaul of its curriculum and overall arrangements, Latvian officials did not see textbooks as being a central instrument for change – contrasting strongly with 1980s Finland and historical and current Singapore. The reasons for this was semiotics: textbooks were associated with Soviet control of the nation. The dominance of textbooks in the didactics of education during Soviet occupation created too strong of an association with the past – modernisation meant creation of new educational arrangements differing not only in content but also in the instruments of curriculum control. As with any nation which forgoes the use of a highly effective set of instruments which carry clear and desirable functions: if you do not use them, you have to use other instruments to achieve the same ends. This can be extremely demanding.

Denmark
Denmark recently has experienced similar upheavals in established relations. Committed to digital transformation, government made available substantial development funds to new tech providers, and shifted control of purchasing from schools to municipalities. Shifting significantly the locus of control to officials who may or may not understand quality criteria or schools needs in detail, schools feel unable to obtain materials linked adequately to their provision. As in Poland, markets are being restructured at a very rapid rate, with direct threat to established, high quality providers.

United States of America
Researchers frequently miss the extent of textbook control in the USA. The existence of different levels of restriction and control in the nation – Federal, State, District – and the considerable tensions between them (particularly over educational reform) means that the highly influential district level restriction of 'text book adoption' processes often are overlooked by commentators. Different phases of reform in different states also affects this, with innovations such as the 1993 Reform Act and subsequent Common Core in Massachusetts shifting control more to state level. The split between state adoption and district/school adoption is roughly 50-50 – twenty-three states choose at state level; thirty other states allow district committees and other agencies, or schools, to choose. Seven permit fees for books, all others provide free books. There is some fee provision in some states for damaged books, or supplementary texts, and some social support arrangements. The adoption processes tend to work on protracted cycles of approval, e.g. six years, allowing continuity of curriculum planning and delivery. Parents are included in the approval processes in some settings.
(Education Commission of the States, 2013)

Hong Kong
Hong Kong private-public partnership regarding school textbooks is interesting. As in previous times in Poland, student workbooks in Hong Kong are a constant, annualised source of income for publishers – they are essentially 'consumables', smoothing revenue streams and allowing investment in development. By contrast, teacher and pupils' textbook sales tend to be highly cyclical and periodic, with textbooks produced as robust, lasting resources. This highly cyclical revenue is extremely difficult for private publishing houses; relieving this, and assuring high volume annual sales, the workbook income stream is an important and mutually beneficial aspect of arrangements (Consumer Council, 2001).

Singapore
Different arrangements obtain in Singapore. Close working between government and publishers allows considerable innovation and evaluation as part of quality development. Mutual trust and understanding appears high (Smart & Jagannathan, 2018) and Singapore has a record of well-managed joint experimentation and development with private publishers, followed by well-managed implementation (Taylor, 2019). For Singapore Maths, impressive transnational research was undertaken to determine the quality criteria for textbooks in key subjects, which then was used for the construction of a comprehensive and well-evidenced criteria for textbook approval, along with expectations of high quality professional development (Kaur, 2014).

England
Completed in the 1990s, the Singapore model informed the development of arrangements for textbook approval in England in Primary maths. The strategy adopted by the 2010 Coalition Government emphasises Schmidt's 'curriculum coherence'. Scrutiny of Singapore maths, Shanghai maths education and leading maths education research led to finely tuned pedagogic principles and criteria for maths materials. The National Centre for Excellent of Teaching in Mathematics (NCETM) was commissioned to administer 48 'hub' schools, which eventually serviced over 10,000 schools with professional development support and means of sharing good practice. Textbooks were designed by publishers to strict criteria and approved for use by the hub schools and the schools which they supported. Two cycles of approval were completed over 18 months, with only one publisher passing the first screening, and two the following cycle. Crucial to the development was a highly successful exchange between Shanghai and England, managed by the NCETM, where teachers from England taught in Shanghai, and Shanghai teachers taught in English schools. The textbooks were a key part of the strategy, aligned closely to the National Curriculum, to the pedagogic and didactic principles, and with design features strongly reinforcing the pedagogic and didactic model.

Reflections

Much of the analysis of governance in this section has been informed by research on paper-based textbooks. The public policy measures for these without exception focus on enhancing availability, but in some setting go beyond this - to guarantees of sustainable supply, quality, and high levels of formal 'curriculum coherence' in Schmidt's classic sense. For some states, this has involved effort to construct a balanced set of requirements and market conditions for private publishers (e.g. Hong Kong, Singapore, England), while for others this has meant high levels of direct state responsibility for

production and distribution (Poland, Shanghai). For countries like Mexico, availability has simply been the priority, without imposing quality criteria or ensuring curriculum coherence.

Graham Taylor's analysis in *Educational publishing in the digital era* (Taylor, 2019) emphasises both curriculum coherence and the partnership and balanced collaboration that we outline above. Although not entirely accurate in relation to all publishers behaviour and all historical examples, alongside Smart & Jagannathan's insightful report (Smart & Jagannathan, 2018) the analysis is valuable in delineating the respective roles, capabilities and propensities of private publishers versus the role, capability and propensity of national government – an analysis vital for setting balanced relationships for development of convergent interests and persisting delivery of the public good of open provision of knowledge to young people. Taylor (2019) usefully describes how some nations have declined into dysfunctional relationships through flawed public policy decisions regarding market form and governance arrangements. This includes the example of Poland, which we cite above.

Critical realist explanations of the behaviour of complex social systems such as educational arrangements and economic arrangements suggest that a state of stability and equilibrium is never achieved (Bhaskar, 1979; Sayer, 2000), and arrangements require constant policy attention and fine tuning to continue to sustain public goods. There are examples of jurisdictions which do attain sustained periods of effective supply of high-quality materials. This has required care in policy formation and constant attention. Notable amongst these is Hong Kong and Singapore. Both allow multiple publishers, both operate strict processes of text approval. In both systems there are occasional periods of concern and tension – from Hong Kong, concern regarding marketing and discounting which breaches legal regulation (Yau, 2020), from Spain regarding alleged price-fixing (Warren, 2019), from Singapore, publisher concern regarding the need to attain growth through overseas sales (Schoppert, 2013).

The evidence points to the absolute difficulty of establishing ***permanent*** stable and balanced relations, as well as emergent imbalances (Rodrigues et al., 2020). This is not a failure of public policy. Rather, it is a feature of social systems like education. Markets shift, financial dynamics change, pressure on private providers develop and change. National curricula are evaluated and reformed. Pressures on public funding shift – in all national settings. As a result, the development of balanced market and supply relations. A clear example of a response to these kinds of shifts is the policy in Ireland, where new national models of textbook rental for school age pupils have been implemented and have proved very popular with parents (Department of Education and Skills, 2012). As popular as this may be, in reproducing in school settings the rental patterns seen in US higher education settings, it is important to note that this significantly adjusts the market structure – and has not yet induced the price escalation in the USA, where rentals have crept to near purchase cost levels (Mattiasson, 2019).

And then we have the impact of digital.

Our section focussing on digital materials examines all dimensions of transformation which are associated with digital developments, including transformation of market dynamics. This affects deeply the public policy positions of national governments. We point to serious market imperfections, particularly those relating to quality and curriculum coherence. Taylor (Taylor 2019) points to the low cost of market entry for those producing digital educational materials, citing the lack of the need for production facilities and distribution arrangements. But the ease of entry can and has been lubricated by the high flows of speculative investment capital into 'exciting' digital material development (United Nations Conference on Trade and Development, 2017). This masks the high relative development costs of complex digital materials which we outline in our section on digital materials.

This lowering of the barriers to entry, plus the impetus from global pandemic, is disrupting the finely balanced respective roles highlighted in the examples above, and is significantly increasing the flow of digital learning applications (McDermott, 2021). Our digital section explains the extent to which this is invoking market dynamics which are not conducive to quality as we would define it: high curriculum coherence and high alignment with pedagogic and didactic theory.

The research on governance and market structures suggests that, with most nations possessing a national curriculum or national standards, and wishing to enhance equity and attainment, the issue of

active and continuous management of producer-state relations and creation of informed consumer action remains a vital aspect of active public policy.

8

Textbook Development: Authorship, Publishing and the Market

There is a substantive lack of research done into textbook authorship, whereby little is known about who textbook authors are, or what their incentives, intentions and decisions are in the writing process. Yet authors are not passive agents in textbook production and development, as textbook writing invariably involves some element of interpreting curriculum frameworks. Authors also report a variety of incentives for writing textbooks, some intrinsic (sharing knowledge in a given field) but also often external incentives. The specific constraints and limitations imposed on authors in the writing process are also numerous. These limitations are not always related to pedagogical concerns in textbook production, but nonetheless shape the final written product.

This section explores how the production of a textbook – from its initial design, to its drafting, and its marketing – involves layers of different actors working in intricate economic relationships of dependency. It examines the process of mediation and adjustment in textbook production that links to publishers' demands, and the influence of the market. Drawing on examples of textbook authorship and publishing in different national contexts, this section focuses firstly on the hidden role of the textbook author, and secondly on the complex and diverse processes of negotiation that stem from author preferences in the writing process, editorial demands, and market forces.

What has been written about textbook authors?

The literature shows that there has been a negligible amount of research done into authors' intentions, ambitions and decisions regarding textbook writing. As a result, we still have little insight into the processes, challenges and market dynamics of textbook writing. The relative scarcity of research into the role of textbook authors in the creation of textbooks is partly attributable to the fact that the individual voice of the author is often not apparent (Sammler et al., 2016), or that textbook writing is considered to be an 'atheoretical' activity rather than a genuine creative pursuit (Issitt, 2004). It is, however, reasonable to assume that textbook authors are not passive agents in the textbook production process, but instead play a role in actively interpreting and translating a curriculum into educational and pedagogical products. While a curriculum may provide a basic framework for covering a subject's content, authors' personal objectives and strategies play an important part in the textbook's development. In other words, textbooks are 'conceived, designed and authored by real people with real interests' (Apple, 1993, p. 46).

To interrogate the content of textbooks, and how they are authored and published, is therefore an important enterprise. In particular, it serves to address the inherent contradiction that publishing research looks only briefly at textbook publishing, but that textbooks nonetheless constitute a large portion of the publishing market.

While research into textbook authors' intentions and ambitions in the writing process is therefore scant, it is important to take note of exceptions that exist – largely in the subjects of history and geography textbook authorship. Lee and Catling (2016) conducted a study on the English geography textbook authors, looking at perceptions, influences and constraints, and the future of textbook writing in geography. They argued that textbook authors often derive intrinsic satisfaction in writing a textbook, concluding personal and non-financial incentives play an important role in decisions to write textbooks. Hopkin (2001) conducted interviews with geography textbook authors and concluded that authors' interpretations of the curriculum were substantially influenced by their philosophies of education in geography, their educational ideologies, and their worldviews. Johnston (2006) argued that even introductory textbooks in higher education can promote an agenda for change within a discipline, promoting some paradigms whilst remaining silent on others. The role of history education in disseminating and reinforcing ideas around national identity, and the role therein of history textbooks as 'powerful cultural artefacts' has also fostered some critical debate about textbook authorship in this subject domain (see Foster, 2011). In many other subject areas, however, we still know relatively little about textbook authors.

Who, then, are textbook authors?

In some contexts, school textbooks are written and edited by experts in the field and are regularly refined through active research – this is the case, for example, for Shanghai textbooks, where there is a clear preference for learning materials to be based on accumulated theory and authored by specialists, and where 'adjustments' are made by teacher-research groups (Oates, 2014). In a study

comparing Slovenian and Polish art history textbook authors, Dolšina (2014) concluded that in her research sample Slovenian writers tended to be academics, while Polish authors were more likely to be teachers, and attributed this to differences in political systems and the positions different types of authors occupy in educational hierarchies. Reviewing the tradition of textbook production in Britain and Germany, Müller (2017) notes that textbook authors may be involved in curricula commissions, examination boards or approval processes; in other cases, authors are primarily employed as teachers, academics, or work with education methodology (p. 8). By and large, in many countries school textbook authors are teachers or educators with active roles in the formal education system. This also means that textbook writing projects in many countries are taken on as side-projects to a full-time teaching career, and frequently as a freelance activity. There are also exceptions to this, such as in the Nordic countries, where textbook authors are often full-time professionals, and textbook writing is taken on as a full-time vocation (Choppin, 2005).

It is very common for authors to be nationals of the country the textbook is marketed in, given that learning materials reflect the cultural values of a society. There are a few instances where this may not be the case. Political dependencies, such as a colonial histories, have meant that school textbooks are often written by non-nationals when there is ongoing political dependence and an absence of independent, national publishing institutions (see Gerard & Roegiers, 2009). The reliance upon former colonial powers for the supply of textbooks, due to a lack of independent publishing infrastructure, has been well documented in academic research as representing a danger of cultural imperialism, and a dependency on Western-generated knowledge (Crossley & Murby, 1994). Policy options for the improvement of textbook development processes in low-income countries remain, however, less discussed in the literature. In other cases, it is specific economic conditions of a country (such as a small population or weak purchasing power) that leads policymakers to turn abroad for school textbooks. In such cases, the investment needed for in-country publishing would result in an unprofitably high cost per unit. Adopting textbooks from abroad can be effective particularly when appropriate materials are already available in external markets – for example, maths and science textbooks produced elsewhere are often considered to be suitable for adoption as they arguably contain less context-specific material. Adapting existing texts is also an option that is sometimes used, where the inclusion of local staff in the adaptation process adds to local capacity-building and training. Crossley and Murphy (1994) cite, as successful examples, the Papua New Guinea case of a comprehensive adaptation of secondary level English and Science textbooks in the 1980s, constituting the redesign and rewriting of existing overseas textbooks complete with the addition of local examples (pp.108-109). Where 'international' content is not adapted or closely aligned with the specific needs of the local market (curriculum, the assessment system, pedagogical traditions and teacher capabilities, language of instruction etc.), it is unlikely to be a high-quality resource or fit for purpose (Taylor, 2019).

Textbook authorship is clearly different from other types of authorship in the sense that there is an 'empty-voicedness' that characterises textbooks. In this sense, textbooks rarely give explicit voice to their author(s): rather, the discourse contained within is the voice of an unknown entity or institution 'more or less authorised by society' (Sammler et al, 2016). Textbooks subsume the voice of the author, sometimes in a way that also makes a claim to objectivity and political neutrality (Issit, 2004). This does not necessarily mean that originality in textbooks is lacking. However, originality takes a backseat to other pedagogical but also marketing concerns, including format and presentation, and how appealing the book might be to its intended audience.

The relative hidden nature of textbook authorship nonetheless has raised questions of accountability in a way that doesn't appear in areas of publishing where the author is clearly visible and can be engaged with.[4] It can be difficult for end-users to identify textbook authors and their credentials. The invisibility of textbook authorship also means that authors do not get direct recognition for their efforts, which is problematic for textbook publishing in higher education as it acts as a disincentive for scholars and academics (Couper 2017). The economics of textbook publishing and the ways it has changed over the last decades mean that questions around author visibility has become more important, as changes in sales and marketing strategies result in larger proportions of anonymous, freelance writing labour employed by publishing houses.

[4] For a more detailed commentary on this, see Guth et al., 1989.

How textbook writing projects are managed – then and now

The processes authors go through in writing textbooks has also shifted historically. Insights from the US, UK and France show that traditional practice was for authors with expertise in a field to pitch a project idea to a publisher – and, in rarer cases, to draft a full manuscript before venturing to find a publisher.[5] In other instances, editors and sales representatives of publishing houses would identify well-known authors in a field and invite them to propose an idea for a textbook project. Relatively unknown writers could become textbook authors but often through a different avenue: 'new' writers would work on smaller projects such as workbooks or teachers' guides, with the aim of establishing a reputation with the publisher in terms of reliability and ability to meet a deadline, before moving on to larger projects.

Over time, this type of 'author-led' initiative for textbook projects has become less common. Publishers have taken on more control and are more likely to propose project ideas to authors directly. In these 'publisher-led' projects, authors often have less creative input. Financial pressures in publishing has meant authors cite an increasing pressure to accept lower fees or royalties, while the drop in financial incentive for experienced authors leads publishing houses to recruit a greater proportion of inexperienced writers. While there is nothing inherently problematic about this, inexperienced writers by definition have less experience. When textbook authors also have less input in the project, they are likely to be less invested in the outcome or the further life of the textbook – this results in high turnover between projects, where it is not always the same authors who work on the second edition of a textbook. A further issue is that teams of writers are therefore cobbled together by project administrators to work on one or several manuscripts. When combined with other externally imposed constraints, such as tight deadlines and fixed budgets, the teamwork aspect of the writing process may also suffer. Large teams of writers need effective coordination: the absence of such coordination, in the form of an experienced series editor or editor-in-chief providing overall guidance and quality assurance, can have a negative impact on quality of output. This was demonstrated in a recent World Bank project appraisal in Vietnam, where textbooks are centrally regulated by the government – poor coordination resulted in curriculum and textbook developers working independently of each other, leading to incoherence and duplication of content (World Bank report, 2015, cited in Smart & Jagannathan, 2018, p. 16).

In addition, a number of constraints on authors shape the content that appears on the pages. Authors create content within the guidelines, boundaries and limitations set by publishers and editors, as the second part of this section explores.

Market forces and publishers

Inevitably, the market also drives textbook development, and publishers attempt to gauge the market in a way that shapes decision-making about content and format. What a textbook author produces goes through multiple editorial layers, where a key interest of editors is a textbook's profitability in terms of sales. This raises concerns that the quality of educational resources decreases when non-educators make pedagogical decisions. In what ways do marketing and editorial mediation influence what goes on the pages of textbooks?

A key concern that arises is the tendency towards standardisation. Teachers and schools exert a strong influence on the content of textbooks as they choose which text resources are used by their pupils, and publishers take a cautious approach by producing the types of resources that will be familiar to teachers. This results in resources from different publishers becoming similar as textbook content is fashioned after existing resources that have seen success on the market (Morris & Adamson, 2010). Oates (2014) illustrated how the 'instrumental' (exam focused) approach in England influences the educational resources market such that publishers supply materials that satisfy teachers' demands for instrumental, performance-oriented resources. The rise in publisher-led over author-led textbook projects also contributes to this process of standardisation, as authors increasingly have less input both in the initial design of textbooks, and throughout the project.

Similarly, publishers 'guess the market' in relation to what governments want. This produces a tendency for self-censorship. When some topics are not acceptable in *some* markets, what happens

[5] This would be comparatively more risky, as the author takes the risk that the project won't be taken on by a publisher, and was therefore less common.

in practice is that publishers catering to different markets decide to exclude certain topics across all their products (see Zemach, 2018). This is particularly evident in an increasingly globalised market. However, neither standardisation nor globalisation are necessarily in the best interests of producing high-quality learning materials. But it is for this reason that school textbooks from competing publishing houses can be seen to provide remarkably similar content, even when contemporary curricular guidelines are less prescriptive in terms of details of specific topics to be covered (Macgilchrist, 2017).

Market dynamics also mean that some actors have more influence than others in the textbook production cycle. At the sub-national level, some districts, states or provinces have more agenda-setting influence than others do. For instance, Macgilchrist (2011) illustrated that the state of North Rhine-Westphalia's (NRW) enjoys a position of greater influence in the German textbook publishing industry, given that it has more schoolchildren than all five new German federal states put together. The effect is that projects on NRW educational resources receive more attention, as they command more of German publishing houses' time and human resources. In the US context, Ansary (2004) distinguishes between states that have a formal textbook selection and adoption process every few years, and those who allow publishers to market programmes and resources directly to local school districts. 'Adoption' states such as Texas, California and Florida therefore have considerable clout in the textbook industry: if a publisher's textbook doesn't make the shortlist, it effectively loses access to a substantial market for several years.

Beyond the obvious requirement of compliance with national curriculum and syllabus demands, textbook authors also find that they are subject to publishers' demands where these are varied and form an additional external influence in the textbook production business. The form of this editorial influence is diverse, ranging from time constraints placed on authors in the writing process; formatting requirements; limits in page space and book length; and the use of language. Textbook authors and research studies on the authorship process have shown that these types of demands place an important constraint on authors during the writing process. A questionnaire study conducted by Lambert (cited in Marsden, 2001) in London noted the weightings given by teachers to different evaluation criteria when selecting a textbook. It reported that criteria such as text presentation and organisation, and the quality of photographs or artwork used, were ranked highly by teachers. In particular, the match of textbook material to examination requirements emerged as a key feature teachers looked for, while teachers were also noted to be generally uninclined or unable (due to time limitations) to undertake comprehensive reviews of inspection copies in their selection (Marsden, 2001, p. 199). An early UNESCO handbook (1970) for producing textbooks equally recommends that editorial demands are among the key factors to be taken into consideration by authors when developing a manuscript, where for instance the author's choice of words is also to be determined partly on considerations of available space (UNESCO, 1970, p. 35).

Textbook authors also note that the economics of textbook publishing has meant that editors increasingly have a sales and marketing background, rather than being subject specialists, former teachers or educators. This underlines the, at times, uncomfortable closeness in textbook publishing with financial profitability. As a result, authors in countries with free market dynamics have systematically argued that it is harder to have a conversation about the content of educational materials with editors who don't have a background in the relevant subject, but whose primary interest relates to the effective marketing of a product. This was commented on by Guth et al. in 1989 as follows (but remains the tendency in the US context until today):

> *The bad news is that the economics of [school] publishing has, in the last ten or fifteen years, started to push secondary textbooks in the opposite direction, because here the sales managers have the upper hand. In the past, a publishing executive had often risen from the editorial ranks (and was, in fact, often an English teacher manqué). Today, as the result of a neat flip, the editor- in-chief is likely to be a marketing specialist in editorial clothes who, with many honorable exceptions, knows as much about the scholarship and pedagogy of English as fellow executives in other suites know about VCRs. They may not know much about what is in the black box, but they care whether it sells*
>
> (Guth, Squire & Boynton,1989, p.15.)

Educational publishers also face challenges regarding the increasing demand for digital learning materials. The difficulty they face is how to create a viable model for producing digital materials that satisfies its users, including meeting expectations of low pricing for such online materials, while maintaining profit margins (Kleeman, 2011; Macgilchrist, 2017; Thompson, 2005). It is a balance that publishing houses struggle to find, as digital learning resources may be perceived by commercially successful publishers as 'cannibalising' a profitable textbook market (OECD, 2009, p. 16). As Taylor (2019) notes, publishers need a secure national legal framework in the form of a funded, secure primary market in order to attract investment and operate effectively. With such a primary provision in place to meet core curriculum needs, there is room for additional provisions from open source material that allows access to copyright material in a way that is not burdensome to users or rights owners (Taylor, 2019, p. 17). The reality of a changing market remains an important consideration for publishers, especially as policymakers have expressed strong support for digital educational resources (see e.g. European Commission, 2018). Publishing houses spend more of their time and resources contesting the quality of open-access educational resources and convincing the public that print materials still play a pivotal role in high-performing education systems. In addition, a particularly notable research gap that currently exists is understanding the transformation of textbook authorship with the advent of the digital age (Otto, 2018). In Section 12, we analyse the paper-versus-digital debate in greater detail.

Reflections

This section has argued that there are still significant gaps in the literature on the dynamics of textbook authorship and publishing, whereby textbook authorship experiences – particularly in specific subjects – are still relatively obscure. Additionally, more has been written about changes in textbook publishing dynamics over time in specific European and North American contexts than in other geographical regions. A notable exception to this is the research that has been done on textbook production in countries transitioning from centrally-planned market structures, where there has been an attempt to create distance from the Soviet regime and its educational materials.[6]

In addition, it is clear that the identities of textbook authors, and the conditions of policy, governance and market dynamics that they work under, also differ significantly by country. These differences nonetheless have important implications for textbook content and production. While in some cases textbook authors are subject experts such as academics, in other contexts authors are teachers and educators undertaking writing projects as a professional side activity. Low-income countries and countries with specific socioeconomic or demographic characteristics, such as a small population size, may also struggle to sponsor textbook authorship or facilitate in-country publishing, and are therefore reliant on learning materials written and published abroad.

This section has also discussed some of the constraints that are placed on textbook authors by publishers, and in particular the questions around profitability that inevitably also shape publishers' decision-making on textbook content and format. In the next section, we discuss the patterns of use of textbooks.

[6] This body of research has been more systematically discussed in Sections 6 (Anti-Textbook Ethos) and 7 (Governance).

9

Patterns of Use

In addition to examining the content and structure of textbooks, it is also necessary to consider how textbooks are used in practice. In this regard, a textbook can be equated to a craftsman's tool, such as a hammer (Fredericks, 2005). A hammer can be used by a skilled carpenter to create an exquisite piece of craftsmanship, allowing the carpenter to do his work with greater ease and ideally to a higher quality. This is largely because the carpenter knows how and when to use the hammer to complete the task effectively and efficiently. However, in the hands of someone else, the hammer may only lead to the building of a rickety bench (Fredericks, 2005), potentially causing more damage than good. Like a hammer, the learning experience that a textbook can contribute to is largely dependent on firstly, the quality of the textbook and secondly, whether the user is able to use it effectively.
Limited attention has been given to the ways that learning materials are used by teachers and learners in situ. It has also been observed that research tends to focus on textbook content and availability (Hansen, 2018; Milligan et al., 2019; Roldan Vera, 2018). However, data pertaining to the content, structure and availability of textbooks only tells part of the story (D. R. Thompson & Senk, 2014). An understanding of how textbooks are enacted in practice must be considered. Textbooks have a wide range of potential uses and authorial intention does not necessarily transfer between contexts (Issitt, 2004). How textbooks are used in practice is dependent on various factors such as the teachers intentions and training, learning context, availability, quality of resources and level of governance regarding textbook implementation (Remillard, 2005). This section will look deeper into this area of research to consider patterns of use as well as factors that influence textbook implementation.

Intended patterns of use

It is obvious that textbooks are created for particular subjects and for particular learners. Less commonly known, however, is that many high-quality textbooks are developed with evidence-based cognitive theory and particular pedagogical approaches in mind. This does not mean that textbooks are all created to be used in the same way. Different textbooks are intended to be used in different ways and by different types of practitioners. Based on a survey of the literature, four key areas of intended use emerge:

Textbooks as a guide to curriculum content and learning structure, and curriculum change

Textbooks, especially those that have been selected through a system of state approval, are often intended to be used as a curriculum guide for teachers when structuring their planning. In this way, textbooks have the potential to embody curriculum goals and parameters to be used to inform, guide and support classroom instruction (Schmidt, 2007). In many jurisdictions, textbooks are used to ensure the curriculum is followed accurately and with an appropriate amount of depth and breadth (Danişman, 2019; Karvonen, Tainio, & Routarinne, 2018; Nicol & Crespo, 2006; Tsyrlina-Spady & Lovorn, 2015; Tulip & Cook, 1993; Valverde, Bianchi, Wolfe, Schmidt, & Houang, 2002). Textbooks also provide structural guidelines for lessons and units to support learner progress (Hutchinson & Torres, 1994; Johansson, 2006). Textbooks can underline the scope, sequence and appropriate pace of progression through the materials (Reys et al., 2003). In addition, textbooks can provide guidance for teachers on how topics should be narrated, what concepts should be included, how learning activities can be approached and what types of skills should be focused on (Danişman, 2019). In high-performing jurisdictions, such as Singapore, teachers rely on textbooks to provide clear learning sequences, clarify the required knowledge and skills, and to provide learning activities to support the learner's progress. For this reason, teachers in Singapore do not view textbooks as a regimented delivery programme, but rather as a helpful curricular guide (Oates, 2014).

When jurisdictions introduce these types of 'curriculum guide' textbooks, the materials are also being used to support curriculum coherence across the jurisdiction (W. H. Schmidt & Prawat, 2006). However, this is only possible if the textbooks are available to everyone and combined with highly qualified practitioners who know how to use them appropriately. In this way, textbooks are intended to assist teachers by organising subject information, sequentially presenting important subject knowledge and skills into units or lessons and, in some cases, guiding the inquiry process (Mcdonald, 2016). For this reason, high-performing teachers welcome the regular use of textbooks within their

classroom which they use effectively alongside their own content knowledge and pedagogical strategies (Reynolds & Farrell, 1996).

Textbooks can also be used to effectively disseminate and action curriculum change. Hutchinson & Torres (1994) argued that textbooks are an effective method of familiarising teachers and students with curriculum change and updated curriculum expectations. Textbooks can smoothly incorporate changes into a scheme of work and can help to ensure that new ideas or approaches are introduced coherently. In this way, textbooks are used to assist teachers in determining and effectively delivering the content of a course while understanding the parameters of the required curriculum.

Textbooks as a source of knowledge

Textbooks can also be used as an authoritative source of knowledge in the classroom. For example, research has shown that novice and non-specialist teachers often use textbooks, teaching guides and related learning materials to support their own understanding of subject matter. Studies emerging from the United States (Grossman & Thompson, 2008) and Finland (Karvonen et al., 2018) argue that mathematics and science textbooks are often designed to support this type of teacher learning, especially for novice teachers who are required to learn a large amount of content in a relatively short period of time.

When teachers are unsure of an answer or a process, some defer to a textbook for clarification. In some classrooms, teachers direct students to look exclusively in textbooks in order to find answers to their questions (Lepik et al., 2015). Positioning the textbook with this level of authority can be problematic, especially if the textbook is of poor quality. The writing style of some textbooks supports this authoritative position by using limited referencing and presenting a perceived measure of consensus (McCabe, 2006). With this level of authority comes great power and responsibility. Some textbooks capitalise on this power to present particular narratives (see Section 10 on sociocultural analysis). However, high quality textbooks avoid the authoritative stance and instead present well-structured and evidence based content alongside methodological clarity and relevant nuances (Araújo & Maeso, 2012).

Textbooks as a guide for independent study

Textbooks are also used by teachers and students to support student learning outside of contact time or for self-study. For example, textbooks can be used to guide students' study by providing necessary reading materials, structured learning activities and opportunities for self-assessment to target specific skills (Karvonen et al., 2018). They can also be used to provide consolidating tasks for students to complete independently (Rezat, 2009). Teachers can use textbooks to provide activities for students to prepare or revise outside of the classroom (Gautschi, 2018). Taking this one step further, Elley (2000) argues that textbooks can act as 'surrogate teachers' when a teacher or classroom facilitator is not available or if the learner is not able to attend classes.

Digital textbooks can also provide learners with avenues to seek additional information or connect to related texts to support their learning. For example, many digital texts allow learners to pass from one text to another through hyper-text or hyper-media (Ivić, 2019). This allows students to access additional reading, dictionaries or related multimedia content to support their understanding. Students are also able to use digital sources to make notes, flag important terms or quotations and embed additional information that may help them in self-revision.

Textbooks as a source for materials and activities to decrease teacher workload

Although the areas discussed above highlight the role of textbooks in ensuring learners receive high quality learning experiences, this does not mean that textbooks are the only way of achieving this. If given appropriate time, resources and clear curriculum guidance, highly skilled and knowledgeable teachers can create effective learning experiences for their pupils – with or without the support of textbooks. However, high quality textbooks can significantly decrease the time and workload of teachers. For example, the lesson or unit structuring included in textbooks can decrease the workload of lesson planning. A study conducted in England that elicited teachers' perceptions on their use of textbooks concluded that access to textbooks saved teachers over five hours of lesson planning per

week, on average (Public First, 2021, p. 5). Learning activities and visual resources contained in textbooks can decrease the time and creative demand needed to personally create them. Teachers can also use textbooks to support ostensive teaching (Mili & Winch, 2019). For example, teachers can look to textbooks to quickly and easily point out complex scientific models and abstract conventions for their students (Harrison, 2001). In a study of general textbooks and their influence in Sweden from 1980-1995, Englund (1999) concluded textbooks provide a key support function to teachers as they guarantee knowledge requirements from the curriculum, give support in relation to the planning and presentation of subject content, and facilitate the evaluation of students (Englund, cited in Brändström, 2005). In her doctoral study on the use of maths textbooks in Sweden in lower secondary school, Brändström (2005) equally argued that textbooks give a learning experience to students that is consistent, while also minimising class disruptions by keeping students occupied.

In short, a good textbook is intended to be a tool used by teachers to avoid tediously creating all materials anew when theory-based learning models and classroom activities are made available to them. This allows teachers to utilise their time more effectively to support their students and to avoid burnout (Independent Teacher Workload Review Group, 2016) and as a result, maintain or even raise the quality of learning that they can provide (Benavot, 2011).

Intended use versus implementation

Although textbooks are being used as they are intended in classrooms, this is not the case for all. In many classrooms, the intended patterns of use do not align with how textbooks are implemented in practice (Thompson & Senk, 2014). Several studies have found that textbooks have a significant impact on classroom instruction, the degree of this impact is largely dependent on how a teacher chooses to utilise the textbook as a resource (Schmidt, 2007; Issitt, 2004) and that teachers within and across jurisdictions do not use textbooks in the same way (Karvonen et al., 2018). In many jurisdictions, teachers exhibit some level of agency in relation to curriculum materials, whether that be flexibility regarding which materials are used, or flexibility regarding how materials are used (Collopy, 2003; Karvonen et al., 2018; Sherin & Drake, 2009). In a comprehensive and cross-national study of mathematics teachers' self-reported use of textbooks, Lepik et al. (2015) observed that teachers in Estonia and Finland demonstrated similar attitudes towards textbooks: teachers were involved in textbook selection, and textbooks had a strong impact on their didactic choices. In comparison, the authors found that maths teachers in Norway were less dependent on textbooks. Across the three countries, Lepik et al. (2015) noted a limited use of the full potential of the textbook, with many teachers simply using the textbook as an exercise book.

Remillard (2005) argues that how textbooks are enacted depends on the context in which they are used. Various contextual factors must be considered relating to how, when and why the learner accesses the learning materials (Remillard, 2005). These factors, which are discussed below, can lead to conscious or subconscious deviation from how the textbook's intended use envisioned by the developer. Teachers play a powerful role as mediators between curriculum materials and classroom activities (Karvonen et al., 2018). Several factors can influence how textbooks are enacted in the classroom such as governance and curriculum policies, teacher training, availability and belief in the anti-textbook ethos. Each will be discussed separately below, but these factors are often interlinked.

Factor 1: Governance and curriculum policies

Many jurisdictions have specific policies related to textbook governance and quality control. For example, in some jurisdictions teachers have full autonomy in how they select and use textbooks. In others, specific textbooks are mandated along with clear expectations of how and when the textbook will be implemented. How the level of autonomy influences learning is largely dependent on the skills and knowledge of the teacher and whether curriculum coherence can be ensured using other means. If teachers and schools have full autonomy with the selection and use of textbooks, then the burden of responsibility is placed on them to select the best materials to support students. For teachers with a strong understanding of the curriculum, subject knowledge and effective pedagogical practices, this autonomy will not negatively impact on the quality of learning because good textbooks will be selected and used appropriately. However, if teachers do not have a strong understanding of what a quality

textbook is or how to effectively use one, then autonomy in textbook selection and application can have significant consequences on the quality of learning and curriculum coherence.

In addition to policies related explicitly to textbooks, other educational policies can influence how textbooks are used in a jurisdiction as well. For example, policy decisions influence how closely curriculum is followed, the amount of funding available to schools to purchase learning materials, the minimum training required for teacher certification and the amount of support and constructive feedback that is given to schools and teachers to help them develop. All of these areas can directly or indirectly influence how textbooks are used in practice. Several of these policy areas will connect with factors discussed further in this section.

Many other factors drive education governance and policy decisions such as political strategy and government funding limitations. A full exploration of those factors is beyond the scope of this report. However, it is worthwhile considering how 'envisioned teaching types' influence policy decisions. Kuhlee and Winch's (2017) typology presents three model types - the craftsworker, the executive technician and the professional technician. Each teaching type possesses different skills and sources of knowledge. Kuhlee and Winch (2017) argue that education policies are made with a specific teaching type in mind.

The craftsworker's approach to teaching is focused on learning while they work with very little emphasis on education theory. The executive technician is a teacher whose practice is controlled by protocols derived from a theoretical basis in order to achieve an aim determined by someone else (Kuhlee & Winch, 2017). Unlike the craftworker, their knowledge is theory-based and their situational judgement is rarely used. An executive technician's approach to using a textbook would be to follow the exact patterns of use set out by the textbook developers and to avoid any deviation or personal judgement. The professional technician draws on both subject and pedagogical knowledge to make appropriate judgements in the classroom. This type of teacher relies on skills as well as higher-order abilities to plan, coordinate, communicate and evaluate. Their development focuses on a mixture of learning relevant theory, controlled practice and reflection on practice (Kuhlee & Winch, 2017).

Although Kuhlee and Winch's work does not refer specifically to textbook policies, it can be connected to how policy makers approach policies pertaining to learning materials as well. Kuhlee and Winch (2017) argue that in the UK, the dominant teaching type that guides policy decisions is that of the craftworker. Teachers are positioned to have very little focus on education theory and therefore, the most important learning occurs on the job. This corresponds to the rapidly expanding salaried, placement-focused teacher training programmes such as Teach Direct or Teach First across the UK. Decreasing the amount of time spent in university-based teacher training means that teachers have less time to learn about the theory supporting the effective use of education materials, or the corresponding theoretical underpinnings of textbooks unless it is taught by their placement schools or through guidance provided by textbook developers.

In contrast to the UK, Kuhlee and Winch (2017) argue that education governance in Germany is guided by the professional technician teaching type. In the German context, teacher education and the teaching profession is given more academic treatment compared to the UK. Although the contents of initial teacher education (ITE) programmes vary across German states, there is still only one pathway to teaching certification – university-based training followed by a teaching placement. During this time, the ITE focuses on supplying trainees with essential academic knowledge, teaching skills along with an overview of their underpinning theories and to approach teaching in a reflexive matter (Kuhlee & Winch, 2017). Higher amounts of reflexive, theory-based training increase the likelihood that these teachers will be taught how and when to use learning materials and therefore less emphasis is on the school or textbook developer to ensure effective and consistent use of the materials is taking place.

Factor 2: Teaching training

This factor goes beyond what teacher training is mandated, which overlaps with the governance factor discussed above, to consider how various training avenues and the specific curricula of training programmes support the use of textbooks. Training regarding how and why to use textbooks can take

place through several mediums such as through ITE programmes, through continuing professional development (CPD) courses and through in-school training delivered by publishers to teachers.

Research has illustrated the importance of adequate training to support effective textbook use. For example, a randomised control trial in South Africa discovered that whether learners used conventional textbooks or custom-designed textbooks had very little impact on test scores. However when teachers were trained to use the materials effectively, there was marked improvement for all participant learners in both test groups (Fleisch et al., 2010). This study suggests that the training of teachers was more influential on student learning than changing the materials themselves. This is not to say that the quality of textbooks is irrelevant, but it illustrates the importance that training holds.

A recent study has found that U.S. educators respond more favourably to curriculum changes and related curriculum materials when they are given good quality professional development training when the curriculum is being adopted (Seaman & Seaman, 2020). The study found that educators who received ample and thorough training were more likely to view a curriculum and related materials as high quality. The report concludes that quality of implementation is at least as important as the selection of curriculum materials.

Research has also highlighted that for textbooks to be used effectively, teacher training should avoid immediately glorifying or rejecting textbooks and other ready-made curriculum materials. Instead, training opportunities should focus on supporting teachers to develop competences to critically and constructively identify and realise the pedagogical potential and limitations of materials (Karvonen et al., 2018).

Factor 3: Availability

Whether textbooks are available for teachers and students to use is an obvious factor that impacts patterns of use. Research into the availability of textbooks has shown that there are two levels of availability worth considering. Firstly, whether the equipment is physically available or not. Secondly, whether the teachers and students can actively make use of the textbooks and all related features (Mustafa & Cullingford, 2008).

Even though international human rights law (IHRL) requires states to ensure that learning materials are available, accessible and of acceptable quality for all learnings, this does not always occur (Beiter, 2020). For example, in many developing countries, textbooks are difficult to gain access to. This may be because they are unavailable in the country, too expensive or in an inaccessible language for learners (Beiter, 2020). Even in high-income countries, availability of textbooks that meet learners' needs can be an issue. This is the case for textbooks in the Sámi language in Finland, where learning materials are in short supply and do not necessarily reflect changes to the Finnish curriculum. Sámi educators note that the textbooks that are available are on average ten years old, and many used in schools can be over twenty years old (Paltto & Suoninen, 2019).

Textbooks may be available in schools but not for student use. For example, a recent study on textbook availability in Rwanda and South Africa found that even though textbooks are widely available, there are contextual barriers that limit how students are accessing them. In both contexts, textbooks are used primarily by teachers in their own planning, but were largely withheld from learners. When learners were given access to high quality textbooks, the learners exhibited a heightened sense of engagement (Milligan, Koornhof, Sapire, & Tikly, 2019).

Like Milligan's work, policy papers from UNESCO (2016) and the World Bank (Fredriksen & Brar, 2015) emphasise the potential that textbooks can have for improving learning outcomes. However, the findings from other research studies highlight that providing availability of textbooks is not enough to ensure effective use and equal impact (Glewwe et al., 2009; Kuecken & Valfort, 2013; Read & Bontoux, 2016). The theme of textbook impact is further discussed in Section 11.

Research limitations in this area

In general, there is a lack of research pertaining to how primary and secondary textbooks are truly used in practice (Duit & Treagust, 1995; Hansen, 2018). Content analysis of textbooks and teacher

surveys does not provide a deep understanding of textbook patterns of use. Further research needs to consider how textbooks 'act' in education as part of a network that includes both producers and users (Roldan Vera, 2018). Research methods should also reflect this with an increased focus on observation methods and ethnographic studies.

We note that further research must also be conducted into how digital materials are used and what factors support or inhibit the effective use of digital materials specifically.

Finally, the research that does exist on patterns of textbook use centres primarily on teachers as the primary actor and user, without much consideration of the ways students use or make sense of textbooks. There is an incipient body of literature that has started to address this research gap, including comparative analysis of different cultures of students' textbook use in different countries. For instance, Wang and Fan (2021) found key differences between students' use of mathematics textbooks in Shanghai and England, where Shanghai students were observed to rely heavily on textbooks and thought highly of textbooks, whereas English students seldom used textbooks and held a relatively critically view of the role of these learning materials. In Finland, Moate's study (2021) explores the deep-rootedness of textbooks in Finnish educational history, and the 'socialisation' of Finnish pupils into the use of textbooks. Additional research pertaining to how learners use and interact with textbooks would provide valuable insight into how textbooks are used in practice by both teachers and pupils.

Reflections

It is clear that patterns of use are not consistent within or across jurisdictions. Different textbooks are used by different teachers in different schools in a variety of different ways. This variety does not necessarily signify weakness. High quality teachers can integrate textbooks into their teaching, using them alongside a variety of other materials to effectively teach their students. The way in which they do this will inevitably vary depending on the teacher, the group of students involved and the educational context. Differences in the factors listed above and elsewhere in this report have emerged as sources of divergence between contexts. Forms of governance, teacher training, textbook availability and whether the teacher or school subscribes to the anti-textbook ethos all influence how textbooks are used and integrated into learning.

What is clear from the research is that consistent and effective patterns of use require the availability of high quality textbooks and for teachers to have strong subject knowledge and explicit training of effective implementation practices. These elements must be supported with clear and consistent education governance.

What is central to all of this is that textbooks must be of high quality. A high-quality textbook in the hands of an experienced and skilled teacher can have immense positive impact on the teaching and learning experience of both teachers and students. However, even in the hands of a less experienced or non-specialist teacher, a high-quality textbook can still make a positive impact by providing subject guidance, modelled learning sequencing and proposed learning activities. Therefore, the primary element for ensuring effective patterns of use is to ensure high quality textbooks are being used. Secondly, training and professional development must support teachers in using them effectively.

10

Sociocultural Analysis

One of the most common avenues of enquiry into textbooks is the socio-cultural analysis of textbook content. Socio-cultural studies seek to understand how textbooks serve as a medium to transmit specific ideologies, beliefs and hierarchies. In this way, socio-cultural studies focus on critically deconstructing and analysing the role that textbooks play in presenting and legitimising official or mainstream knowledge (Niehaus, 2018). This area of research is vast and incorporates an array of interdisciplinary theories and methods which often merge content analysis and discourse studies (Christophe et al., 2018).

Socio-cultural studies tend to reflect on how hegemony, power and dominant identity are promoted through textbook content, as well as specific social, political and cultural beliefs and narratives (Christophe et al., 2018). Depending on the focus and research design employed, socio-cultural studies can focus on themes such as representations of gender, race, citizenship, socio-economic status, age, ability/disability or religion, to name a few.

Although socio-cultural studies have been conducted using textbooks from all subject areas, some trends do exist. For example, in many countries, studies focusing on History textbooks are the most extensive and incorporate a range of interdisciplinary theories from post-colonial studies (for example (Kim et al., 2013) to LGBTQ + and heteronormative narratives (for example Wylie, 2012). In contrast, sociocultural studies focused exclusively on Maths tend to be fewer in number and often focus on representations of gender for example (Ott, 2015), and cultural groups (Fan et al., 2018).

Another distinguishing element separating different socio-cultural studies is how the researcher(s) approach or position the status of knowledge within the textbook. Some socio-cultural studies employ a constructivist lens and position the knowledge or ‘truth’ conveyed in textbooks to be socially constructed and heavily mediated by the views and experiences of textbook developers and teachers. In these studies, knowledge in textbooks is often viewed as ‘knowledge of the powerful’ (Young et al., 2014). This is common in studies that are analysing history, social studies or humanities textbooks. Studies that focus on the ‘knowledge of the powerful’ critique the knowledge or ‘truth’ that is presented as well as the sources or basis of that knowledge. For example, the work of J.W. Loewen (2019, 2018, 2017; 1995) has focused on highlighting and deconstructing the inaccuracies that are conveyed in the historical narratives of some American history textbooks.

Other studies do not critique the knowledge being conveyed, but rather focus their analysis on what knowledge is being included and how that knowledge is being presented through examples and illustrations. This focus on the discourse surrounding knowledge, as opposed to the knowledge or ‘facts’ themselves, aligns with the concept of ‘powerful knowledge’ (Young & Muller, 2013). This positioning of knowledge is more commonly seen in studies of Science or Maths textbooks. In studies that align with the ‘powerful knowledge’ view, knowledge is positioned as testable, reliable, is not socio-culturally specific and is always open to disciplinary challenge. For example, Namatende-Sakwa (2019) examined Physics textbooks in Uganda to uncover how masculinities and femininities are signalled. Drawing from the work of Sunderland (2004), Namatende-Sakwa focused on how language, visuals and objects referred to in the textbook point to particular gender expectations and norms within Ugandan society. In this way, the study is not critiquing the scientific knowledge, such as the theory of gravity, but rather the discourse that is used to present that scientific knowledge.

The importance of socio-cultural analysis

Socio-cultural studies serve as an important source of reflection and contribute to the development of textbooks. They can encourage necessary critique and widen discussions on the quality standards of textbook content. Socio-cultural studies can merge the theory and literature of an innumerable number of fields such as gender studies and colonial studies, and apply them to the field of education textbook research. Merging these fields produces fruitful findings that lead to critical and valuable discussion that fosters continual improvement of textbook content and patterns of use.

Socio-cultural studies also encourage constructive critique of how and what knowledge is presented within textbooks. This is necessary for all areas of education as understandings of subjects as well as understandings of the process of teaching and learning evolve. For example, awareness of the

complexity and fluidity of identity in 2020 is significantly different than how identity was conceived by most in the early 20th century (Brubaker et al. 2006; (Szakács, 2018). Furthermore, evidence now shows that how identities are represented in curriculum materials has implications on learner development.

The analysis of textbook content is also necessary to highlight and deconstruct the political, social and economic perspectives that may implicitly or explicitly influence or restrain textbook quality. Moving beyond textbook quality, the contents of textbooks can also influence social cohesion and peace. For example, Japanese history textbooks in the 1980s and 1990s gathered an immense amount of attention, criticism and international tension between Japan, South Korea and China due to their inaccurate depiction of Japanese wartime and imperialist behaviour (Schneider, 2008). For instance, the Ministry of Education requested that authors replace the term "invasion" (*shinryaku* 侵略) by "advancement" (*shinshutsu* 進出) (Guex, 2015). Another crisis broke out in 2001, with the publication of nationalist textbook the Japanese Society for History Textbook Reform. Government groups and social groups in Korea and Japan protested, stating that the Japanese government was promoting an erroneous sense of history that rid Japan of any wrongdoing in the past. The government of South Korea charged the Japanese government with violating the Neighbouring Country Clause (Guex, 2015).

Another example can be seen in Texas, where controversy erupted in 2010 when the Texas State Board of Education revised curriculum standards and textbook guidelines to promote a conservative, Christian revisionist narrative of Texan history (Bragaw, 2010). The negative feedback from scholars and many groups in wider society argued that the curriculum and textbook standards presented a "heavy-handed religious and ideological bias, historical inaccuracy, whitewashing of unappealing aspects of American history, inattention to diversity issues, idiosyncratic emphases…" (Chancey, 2014, p. 327). Further textbook controversy emerged from Texas in 2015 when the Texas Board of Education refused to allow history professors to review and fact-check textbooks that were to be implemented that year (Garza & Hammack, 2016).

Although textbooks in Japan and Texas have evolved to an extent, the social segmentation and harm that these textbooks contributed to is still a worthy area of analysis, especially due to the continued social tension relating to the issues (Agarwal, 2019; Koga, 2020). Socio-cultural studies play an important role in unearthing and analysing these inaccuracies and biases to understand root causes as well as implications. These studies can bring into question the methods and processes of development by posing questions such as: What learning goals are being prioritised? Who is involved in development? How are textbook topics selected? There is power attributed to those who make these decisions. For good quality textbooks, these decisions are made based on evidence and expertise, however this is not the case for all textbooks and indeed, evidence can evolve. Therefore, there must be continual reflection on the socio-cultural influences of textbooks (Höhne, 2018) just as scholars reflect on the methods and principles of their disciplines.

The socio-cultural analysis of textbooks is also valuable because it serves as an entry-point for critical reflection on the wider educational contexts and systems. In this way, textbooks serve as a physical material that can be analysed, deconstructed, historically placed and personally attributed to its authors, publishers, purchasers and users. Other mediums of learning, such as what a teacher says or does in the classroom is more ephemeral and therefore difficult to access, trace and deeply analyse. Textbooks open the conversation about what is being prioritised and valued in education systems. Although these sociocultural studies use the textbook as the entry point, viewing the textbook as a sociocultural artefact enable the findings and recommendations to have wider implications than simply improving the content of a singular textbook. They encourage critical discussion of what, how and why knowledge and skills are taught in a particular way, and in some cases reflection on why it is taught at all. In this way, the textbook serves as the tangible and physical evidence of messages that are being transmitted in wider society. These studies should not be a reason to ban the use of textbooks. Getting rid of textbooks would not vanquish the existence of prejudice, misrepresentation, bias or hegemony in schools or in society. These elements are promoted and reproduced through many mediums beyond the textbook.

Misconceptions and fault lines of socio-cultural analysis of textbooks

Although socio-cultural studies are valuable and necessary, these studies can vary in quality and potential impact. Like all areas of research, the rigour and applicability of findings is not consistent. To assess and extract value from this area of research, several popular misconceptions must be highlighted, disproved and eliminated from future socio-cultural studies.

Myth 1: Textbooks are an authoritative source of knowledge in the classroom.

Many socio-cultural studies of textbooks position textbooks as the authoritative source of knowledge in all classrooms. For example, Foster and Crawford (2006) write that 'children learn in early schools that textbook knowledge is both important as well as true even though both conclusions may be seriously contested' (p. xiii). However, as Section 9 illustrated, textbooks are not all used in the same way by teachers or by students. How a teacher presents and positions textbooks will affect how students interpret their contents. Experienced and knowledgeable teachers will often use the textbook flexibly and alongside a series of other sources. In addition, class-based materials should not be seen as the only source of knowledge that students encounter, especially with the rise of digital resources available at a student's fingertips. In short, to position textbooks as the dominant, authoritative source of knowledge in classrooms is not realistic in most contexts and discredits the intelligence and ingenuity of teachers and students to access additional sources of knowledge.

Myth 2: Textbooks are the problem

Other studies base their analysis and recommendations on textbooks being the root of the problem of inaccurate, prejudice or unrepresentative content. In 2015, Richard Culatta, director of educational technology at the US Department of Education, called for textbooks to be eradicated because they presented information that was out of date, did not engage or connect with students and encouraged a form of learning that was not supported by evidence (Wiggins, 2015). Here, Culatta is basing his argument on the misconception that textbooks are the root the problem, while advancing the idea that physical textbooks are obsolete in the digital age. He is presuming that if textbooks were not present then information teachers use would draw on digital sources that can be updated in real time, that content would connect and engage with all students and that only evidence-based approaches would be applied. This reductivist thinking is convenient, but false, and forms part of our discussion of the artificial 'paper vs digital' divide in Section 12. Textbooks are part of a wider education system and in many ways, are a product of that system as opposed to the source of the system. As discussed above, textbooks are a sociocultural product and are mediated by the context in which they are developed and applied.

Myth 3: Textbooks are subjectively constructed

Another prominent misconception within socio-cultural studies is that textbooks are subjectively constructed. Drawing on cultural, social and economic reproduction theory (Bourdieu & Passeron, 1977; Jessop, 2008), some literature portrays textbooks as being almost entirely subjective and unsubstantiated. Höhne (2018) refers to the production of textbooks as an 'arena of discourses' where various social elites and interest groups collaborate with the state on the production of textbooks. Spring (2007) in Herath (2020) writes that "textbooks are not merely carriers of ideologies, values, cultures and histories of dominant groups, but also an arena in which they sustain hegemonic control of knowledge construction and selection." In both extracts, textbook development is positioned as a power struggle, evoking images of an aggressive arena. However, this representation depicts the knowledge within textbooks as exclusively the knowledge of the powerful. It ignores the evidence-based development of many high-quality textbooks that focus on conveying powerful knowledge (Young & Muller, 2013). That is not to say that textbooks and other educational materials do not carry important responsibility and that elements of power and reproduction do come into play. However, high-quality textbooks are not based on subjective and unsubstantiated authorship. They are based on empirical evidence, disciplinary knowledge and pedagogical theory.

Examples of leading research in socio-cultural analysis of textbooks

As discussed above, socio-cultural studies can span a range of topics and themes. For example, socio-cultural studies can focus on representations of gender, sexuality, nationality and citizenship, race, ethnicity, cultural groups and social classes. Each of these themes will be discussed briefly below. However, this list of themes nor the example studies addressed within them are intended to provide an exhaustive list since that list is endless and always expanding. For example, socio-cultural studies can also address themes related to representation of belief systems and religions (Ali, 2008), on sustainability and the environment (Ide, 2018) and on representations of (dis)abilities (Cheng & Beigi, 2011). In short, the field of topics addressed in the scholarship is broad and far-reaching resulting in a constructive critical discourse calling for change and further development of textbooks. However, this increased awareness of socio-cultural representations has not significantly broadened the scope of textbook theorisation, nor has it significantly deepened our understanding of how the recommendations emerging from these studies would impact learners. These limitations will be discussed further at the conclusion of this section.

Gender/sexual diversity

The study of gender representation in textbooks is a common theme in socio-cultural studies of education resources. Gender can refer to representations of women, men and non-binary identities. Regarding studies focused on the representation of women in textbooks, Chisholm (2018) notes that most studies come to the same conclusion that women are underrepresented, negatively represented and misrepresented relative to men. Chisholm (2018) illustrates this through examples from a variety of subject areas, educational contexts and time periods. Although some studies showed an improvement, the vast majority conclude that constructions of masculinity and femininity continue to devalue and marginalise women. The attention given to this area of textbooks has meant that many groups and international agencies are working to combat sexism and gender inequality in textbooks through a critical review of textbook content partnered with recommendations for revision (Chisholm, 2018). However, very few studies have attempted to review the impact of these recommendations when put into practice.

In comparison to studies focused on representation of women in textbooks, there are relatively few studies that focus on LGBTQ+ content in textbooks (Höhne & Heerdegen, 2018). Although there are a number of studies that analyse how sexual identity is presented in textbook content, few examine LGBTQ+ identities (Hawkins, 2012). Höhne and Heerdegen's (2018) review of these limited number of studies found that they tended to focus on high school textbooks from the global north. The main findings of most studies are that there is very little, if any, LGBTI+ representation in textbooks and heterosexism is prominent (Höhne and Heerdegen, 2018). The absence of these studies may further signify that the cisgender and heteronormativity that many textbooks implicitly demonstrate is representative of the world's wider heteronormative conditioning. References that are made tend to relate to 'gay' representation and not transsexual, bisexual or intersexual identities (Höhne and Heerdegen, 2018).

Nationality and citizenship

Carrier (2018) provides an overview of textbook research pertaining to how nations and nationhood is represented, looking specifically at publications from the Georg Eckert Institute from 1951 to 2017. Carrier notes that only gradually from the 1960s onwards did textbook research begin to focus on content analyses of social, geographical and historical issues within a given jurisdiction's textbooks (Carrier, 2018). This period saw the rise of studies devoted to comparisons of textbook contents were very high in number, especially relating to national narratives relating to conflict (Carrier, 2018). By the 1980s, research pertaining to national perspectives and approaches shifted to single-issue topics relating to the social diversity of nations, including representation of gender, cultures and languages. Carrier (2018) argues that in both foci of research, there is still a neglect of textbook theorisation. In addition, Carrier (2018) observes that "the concept of nationhood is often defined in terms of stereotypes and alterity against a background of conflict" (p. 192).

Moving beyond those published by the Georg Eckert Institute, examples of textbook studies focused on the theme of nationalism can be seen from around the world. In Turkey, Ceylan & Irzık's (2004)

work has revealed that textbooks in Turkey, before the curriculum reform of 2005, promoted an essentialist definition of nationalism in not only history and social science textbooks but also science and maths textbooks. However, this trend continues. Following the 2005 national curriculum reform, Çayir's (2009) work considers how Social Studies textbooks in Turkey present a narrow definition of Turkish nationalism and citizenship which is supported by themes of ethnocentrism and essentialism. Çayır's (2009) discusses that at the time of publication, the programme and textbook for the Turkish secondary course 'Studies in National Security' is devised and taught by military personnel, thus further promoting the powerful role of the Turkish army and the importance of protecting national security. Çayır's (2009) argues that Turkish Social Studies textbooks are imbued with essentialist nationalist precepts and a duty-based notion of Turkish citizenship. In the final sentence of the article, Çayır's (2009) calls for a renewed reform to education and new national textbooks which extend the concept of nation to include ideas of diversity and difference.

Race and cultural representations

Textbook analyses concerned with representations of race tend to approach their analysis in one of three ways – through the lens of multiculturalism, anti-racism or Critical Race Theory (Chisholm, 2018). In the multicultural approach, textbooks are analysed for prejudice, discrimination, stereotyping and othering (Chisholm, 2018). Anti-racist approaches focus on how racism is present in the systemic, structural and social power relations that are presented within textbooks (Grawan, 2014). Studies focused on Critical Race Theory focus on how narratives of race normalise particular beliefs and practices such as colonialism and slavery (Araújo & Maeso, 2012), thus further contributing to divisions of power and misconceived biological notions of difference (Chisholm, 2018).

However, some studies cross several of these themes of analysis. For example, Montgomery's (2005) study of Canadian History textbooks from the 1940s until 2005 found that although more recent textbooks increasingly include the topic of racism, the positioning of race as a simple construct linked to origin, ethnicity and descent still persists (Montgomery, 2005). Montgomery's study also illustrates that Canadian multiculturalism is often unquestioned, presenting Canada as a 'raceless' state. Montgomery (2005) argues that "the absence of any coherent engagement with the specificity and significance of "race" as a social construction permits this idea to flourish in much the same way as it did centuries ago, as a fact of Nature" (p. 315). Montgomery (2005) recommends that courses and textbooks linked to social studies, such as History, should examine the social construct of 'race' with students and to deconstruct notions of race to undermine the white hegemony.

Socio-economic status

Chisholm (2018) argues that studies of textbooks in relation to class have taken three main forms. The first focuses on the presence or absence of different classes within textbook contents and the political as well as social implications of this inclusion or exclusion. The second lens relates to analysing textbooks for how distribution of power is presented or implicitly accepted, which links to the idea of the 'hidden curriculum'. This is not to say that textbooks only present knowledge of the dominant groups (Apple, 2004), but rather that textbooks provide an avenue for legitimising cultural systems and structures by excluding the role of conflict, negotiation and compromise (Chisholm, 2018). The third approach to textbook studies in relation to class focuses on the kinds of knowledge made available to students. For example, Anyon's (2008) study of textbook use in the United States found that textbooks chosen by schools predominantly attended by working-class children generally contained less information, fewer research-based activities and more focus on facts to remember. In contrast, textbooks used by schools with predominantly middle-class and affluent students tended to have more inquiry based activities and an increased focus on academic and conceptual knowledge.

Reflections

There are several limitations associated with current approaches and scope of socio-cultural analysis of textbooks.

Firstly, most studies focus on content, text and discourse analysis, but do not consider impact or how that text is implemented and used by teachers and students (Niehaus, 2018). In addition, many

studies make recommendations in the conclusion of their work, but do not go further to assess how their recommendations would be implemented in practice or what the impact of those recommendations would be.

Typical structure of a socio-cultural study:

- ✓ Identification of concern (e.g. representations of masculinity)
- ✓ Literature review related to this area of socio-cultural textbook studies
- ✓ Method for analysing textbook content
- ✓ Analysis of textbook content
- ✓ Presentation of findings/formalised critique
- ✓ Recommendations for development
- X Application of recommendations
- X Analysis of impact of applied recommendations
- X Empirical contribution to the theorisation of textbook development

It is understandable that there would be funding and time limitations to extend the parameters of these studies and this is not the fault of the researcher. But, these studies must be built upon so textbook development theory can be fostered. As we go on to explore in section 11, not all social research on textbooks leads to policy or practical recommendations. The absence of the application of recommendations and the analysis of impact of recommendations serves as a missed opportunity to deepen understanding. Resources need to be attributed to understanding how key recommendations emerging from socio-cultural studies impact learners.

Studying the impact of these recommendations would also encourage researchers and developers to more deeply reflect on the intersectionality of socio-cultural representations, which leads to the second limitation of this field of textbook analysis. Very few textbook studies look at the intersectionality of multiple categories of difference (Niehaus, 2018) and very few use mixed method approaches (Chisholm, 2018). Elevating socio-cultural analysis beyond a one-dimensional approach will provide insights that are more reflective of the multi-dimensional nature of classrooms.

Thirdly, socio-cultural research is very prominent in certain contexts, but it is less prominent in others. For example, there is a large body of research considering the representations of race, gender and class in textbooks from a wide variety of subjects emerging from the global north-west. However, socio-cultural studies pertaining to race, gender and class are comparatively infrequent in the former Soviet socialist bloc (Chisholm, 2018) and the global south (Tikly & Barrett, 2013). An increased number of international studies would present additional insights and ideas of best practice that are not uncovered when only considering the scope of one national context.

11

Impact

Do textbooks work? Elsewhere in this report we have dealt tangentially with the impact of textbooks. Impact was examined firstly in relation to quality (Section 5) where it was noted that existing textbook research has a tendency to use 'availability' as a proxy for quality, while other appraisals of textbook quality are often centred narrowly on cultural critique. We argued that a broader consideration of 'quality' should encompass curriculum coherence, but also the role of textbooks in enhancing both attainment and equity (Hanushek & Wößmann, 2006). Section 9 argued that textbook impact cannot be adequately assessed without accounting for patterns of textbook use. In this section, we refocus the argument more explicitly on impact, examining the state of the literature on research impact, textbook impact and policy impact.

It is first useful to understand how impact is defined in research.

Impact is considered the tangible difference made in people's lives as a result of research conducted (Education Endowment Foundation, 2020). This difference is often measured in societal or economic terms, where the British Academy's definition of impact includes 'notions such as 'public value' or 'public benefit'', while Research Council UK considers research impact to be the 'demonstrable contribution that excellent research makes to society and the economy' (both cited in a Russell Group report, 2012, p. 10). The ways that impact can take form are indeed diverse, including but not limited to: the fostering of global economic performance; increasing the effectiveness of public services and policy; enhancing quality of life, health and creative output. Education research in particular is valued for its potential to carry impact in terms of pupil attainment and equity. There are significant individual costs associated with education failure, as leaving school is linked with reduced life prospects, but educational failure also has societal costs.

In exploring 'impact' we consider it important to differentiate three aspects of impact.

Firstly, the impact of the use of textbooks and related materials. Typically measured through the attainment of young people, we see 'impact of use' not being a simple binary 'use them or not use them' since our transnational analysis indicates many different factors interacting to determine exactly what form textbooks take in a particularly setting and precisely how textbooks are used.

Secondly, the impact of the research on textbooks on their quality and use, and the subsequent impact of research on policy formulation. Research on textbooks has waxed and waned, has been utilised or not utilised by policy makers and practitioners, and has been neglected, intermittently used or systematically commissioned and exploited. Against the backdrop of the ongoing debate on evidence-based policy-making in science-policy interfaces, we consider it important to weigh the empirical evidence that underpins the use of high quality print materials.

Thirdly, the impact of policy, and the political economy of conditions around textbook production, on textbooks in specific national contexts. We know from Schmidt and Prawat's 'control' analysis that very different forms of political organisation can still result in 'curriculum coherence'. The specific way in which public policy on textbooks and related materials is formed and enacted therefore is of interest to this study. In addition, dynamics of textbook publishing are highly dependent on economic and cultural factors that are prone to shifts.

Impact of use

As noted in Section 9, research on textbooks does not always tell us how these materials are actually used in different settings. Although policy attention on the matter of quality of teaching materials is now more common, featuring in public debate on education, the relationship between *quality and learning outcomes* has not attracted similar attention in either academic or education policy circles (Fuchs & Henne, 2018).

According to Heyneman (2006), an effective textbook is one that is pedagogically effective and

accessible to the full range of a learner's experience and ability:

> *It is natural in the teacher's hands. It is expected to build readiness for the next level, its modules fit well with teacher preferences and choices, and it chooses topics and their sequencing based on an understanding of student preferences. Learning how students respond to various language levels, sequences, and the mixture of pedagogical strategies is why good textbooks are rare and why effective textbooks are always more costly*. (p.47)

We have noted that patterns of use are therefore a key variable to be considered in studies on textbooks and their impact, but this remains an area of textbook research that is still underdeveloped, and particularly so in certain subjects.[7] Rezat commented (in relation to maths textbooks, although the assertion arguably applies to other subjects): 'mathematics textbooks should not be a subject to analysis detached from its use' (Rezat, 2009, p. 1260). There are still some notable exceptions: recent research on textbooks has made an effort to pay attention to the interactions between teachers, students, textbooks and subject matter, looking for instance at how textbooks act as 'artefacts' in teaching and learning situations (Shield & Dole, 2013, p. 185). These interactions can be complex, and the authors concluded that teachers' reading of textbooks is influenced by their own perspectives and interpretations. Other studies have similarly focused on the use of textbooks by teachers. In an empirical study, Remillard (2000) concluded the use of a set textbook by different teachers can produce a selective and interpretive reading. Insights from studies conducted in different countries underscore the role of the textbook as a tool in guiding teachers' teaching, such as in the Netherlands where the textbook is seen as key in improving mathematics education and supporting teachers in carrying out their tasks (Heuvel-Panhuizen, 2001). Carretero et al.'s (2012) cross-national comparison noted that use of textbooks in the US differed substantially from textbook use in Swedish classrooms. They argued that the decentralised nature of the Swedish education system meant that textbook use varied widely across Swedish classrooms, where textbooks were often used as a complementary teaching and learning tool; in comparison, US textbooks were more extensive, covered a greater range of content, and teaching and learning activities were more centred on the textbook.

Largely, these studies have allowed insight into how textbooks are used by teachers, and teachers' perspectives on textbooks. Some research has examined physical features of textbooks and correlations with learning outcomes. These have allowed inferences about textbook use to be made: for instance, empirical studies on textbooks in quantitative subjects have concluded that the weight of a topic in a textbook (e.g. the number of pages devoted to a topic) has a positive relationship with pupils' learning of that topic (Erbas et al., 2012; Törnroos, 2005). Behnke's study on students' visual attention when using textbooks revealed relatively little attention paid to photographs and images, and comparatively more pupil focus on text (Behnke, 2018). Her conclusion is supported by other studies of pupils' interpretation of textbook images that have similarly concluded that pupils encounter greater difficulties in image interpretation than understanding text (Pintó & Ametller, 2002; Testa et al., 2014).

Finally, we know from a few existing research studies, conducted in specific contexts, that the ways in which textbooks are used qualitatively in the classroom can be influenced by a range of social and cultural factors. Milligan et al.'s (2017) study on textbook use in Rwandan classrooms illustrated that beyond the question of textbook supply, teachers' concerns about textbook quality and a mismatch between textbook content and learners' linguistic capabilities emerged as key factors that helped to determine actual use of textbooks in classrooms. In a small-scale study of classroom observations conducted in Kumasi, Ghana, Opoku-Amankwa (2010) observed that classroom norms and the sharing of textbooks (despite a 1:1 textbook-to-learner ratio outlined in Ghanaian policy) influenced textbook use. Kalmus (2004) argued that pupils' social and personal contexts – including ethnicity, gender, social class, and even personality – affects interpretation and use of textbooks, noting that this is seldom accounted for in conventional textbook research. She concluded that researchers thus fall into the trap of '[underestimating] children's roles as active, resistant, and sometimes cynical readers' of textbooks' (p. 471). These studies point to the importance of further expanding our understanding of the qualitative use of textbooks in the classroom in textbook research, and the influence of social and cultural norms and identities on textbook use.

[7] For instance, there are comparatively more studies on the use of mathematics textbooks than social studies textbooks (Fuchs & Henne, 2018).

Another important gap that emerges from the above summary of the state of research on patterns of use is a methodological gap. Our analysis confirms what Fuchs and Henne (2018) have noted in their assessment of the current state of patterns of use research: that many studies have concentrated on understanding teacher perspectives on the use of textbooks, or have drawn their conclusions from lesson observations. Comparatively, *pupils*' perspectives on textbook use are largely limited to studies evaluating textbooks themselves, or on pupils' use of electronic textbooks published over the last decade.

In Section 8 in this report on Textbook Authorship and Publishing, we explored in greater detail the literature on style, format and presentation of content in textbooks, and how stylistic considerations form a part of the textbook production process, but also how presentation of content potentially impacts textbook use. In Section 9 on Patterns of Use, we argued that it is necessary to consider how textbooks are used in practice, drawing on evidence from different national contexts to unpack these interactions between textbooks and their users. We have highlighted in this section where the key research gaps on textbook use are, and reiterate that understanding dynamics of textbook use by both teachers and pupils in a classroom is a fundamental aspect of understanding textbook impact.

Research impact

There has been a distinctive push for more 'research that matters' by policy organisations. It is important to distinguish impact from its traditional meaning in *academic* terms, often measured in terms of contributions made to theory and methodology; and *personal* research impact, that includes outputs in research such as citations and related metrics. While research impact is often evaluated in these terms at the individual level, it tells us little about the usefulness of research to wider stakeholder groups and the difference made in economic or social terms, i.e. societal impact.

The UK's Economic and Social Research Council (2021) notes that impact of research – whether academic, economic or social can be:

- **Instrumental**: influencing the development of policy, practice or service provision, shaping legislation, altering behaviour
- **Conceptual**: contributing to the understanding of policy issues, reframing debates
- **Capacity building**: through technical and personal skill development.

Crucially, effective and high quality research has greater potential to produce high quality impact – but it is not always the case that one follows the other. High quality research might not always have wider impact. However, as publicly funded research is increasingly expected to have impact beyond traditional and narrow academic understandings of the term, there have also been corresponding expectations from researchers, and research funders, that social research findings are indeed taken up and used to inform policy choices.

The impact debate has implications for education research and policy. In education, the push for evidence-based policy formulation has produced a drive to understand and, insofar possible, unpack the impact of specific interventions or teaching approaches on learning outcomes. This raises important questions about accountability in any proposed education reform: what evidence is there from research, and to what extent does rigorous research underpin policy intervention? Using an example from their study of the impact of early tracking in different countries, Hanushek and Wößmann (2006) argued that policymakers must be held accountable for their policy choices on the basis of the latest and rigorous social scientific analysis:

> *From a policy perspective, it seems incumbent on those advocating early tracking in schools to identify the potential gains from this. [Our] preliminary results suggest that countries lose in terms of the distribution of outcomes, and possibly also in the level of outcomes, by pursuing such policies*. (p.75).

What does this mean for textbook research and its use? Section 6 discussed the problematic lack of an evidence base to support the 'anti-textbook ethos', and restated the need for evidence-based research to underpin approaches to textbooks in education systems. We noted however that not all studies make concrete recommendations for reform based on their findings, reflecting to some extent

the lack of broader theory development that affects the field of textbook research as a whole (see Section 10). In addition, it is a challenge that while rigorous research can determine the ways in which high quality learning materials can positively influence pupil attainment, there is no corresponding guarantee of uptake in policy circles, even in instances where concrete recommendations for policy are made. Finally, it is also not always evident to what extent findings in textbook research are used in any subsequent policy reform.

The following list summarises some of the key policy-relevant findings generated by studies on textbooks, and their quality and use. (Note that this list is not intended to be exhaustive.)

- **Cost effectiveness**: Research has shown that textbooks are a cost effective tool in improving pupil attainment (Behnke, 2018; Fredriksen & Brar, 2015). Looking at the example of several francophone African countries where textbook access is still limited, Frölich and Michaelowa's (2005) regression analysis concludes that book sharing and knowledge sharing practices ensure that textbooks nonetheless have a wide reach. Some studies have argued that the evidence of textbook impact as a cost-effective input for improving learning outcomes is mixed – e.g. Glewwe et al. (2009) note improvements linked to systematic provision of textbooks only for learners who were already high achievers.

- **Positive impact on teacher workload**: it has been shown that pedagogically sound textbooks reduce teacher workload and optimise instructional time (see Section 9).

- **Teacher training**: training teachers in the use of textbooks has been shown to be an important avenue for textbook impact, aside from textbook development itself (Fleisch et al., 2010; Menntamalastofnun & Cambridge Assessment, 2019), with teacher training recommended as a policy priority (Milligan et al., 2019).

- **Socio-cultural analysis**, e.g. gender and race: research on textbook representations of gender has largely concluded that women are underrepresented and negatively represented in textbooks in comparison to men (Chisholm, 2018). Studies applying a critical race theory lens to textbooks have argued that textbooks still reproduce racism by reinforcing structural and social power relations (Grawan, 2014), and have recommended that social studies textbooks should critically examine the social construct of race (Montgomery, 2005).

- **Underpinning with learning theory**: Studies have recommended textbooks to be underpinned with learning theory and theories on subject-specific content (Oates, 2014). A high quality textbook should enable ‘deep learning’. For instance, Shield and Dole (2012) conclude that a well-designed textbook – where thought is given to structure and topic sequencing – can assist teachers to create learning environments and teaching sequences that support the deeper learning of mathematics. A Serbian study that examined the impact of introducing an innovative geometry textbook drawing on theories of complex learning had a positive effect on pupil attainment in the subject (Đokić, 2015).

- **Textbook design** and innovation: Innovation in textbook form, content and function emerged in England during the 1960s and 1970s, and informed the development of high quality learning materials in other countries, e.g. Singapore (Oates, 2014).

- **Skills and competencies**: Behnke (2018) noted that ‘numerous textbooks do not yet satisfy the requirements of modern curricula in terms of attending equally to the acquisition of competencies, important skills and ‘powerful knowledge’’ (p. 389).

Meanwhile, policy studies (both national and international comparisons) on textbooks and related learning materials have enabled researchers to determine which policy decisions have had a positive effect on textbooks in terms of their quality and their use.

Impact of policy, political economy and political organisation

The state is an important player in the dynamics of textbook production and their regulation. Crucially, the state retains power to define education and the specific types of knowledge that are disseminated

in schools. However, textbooks are also 'published within the political and economic constraints of markets, resources and power' (Apple, 1993, p. 46). The evidence presented in this report has demonstrated, by drawing on different national case studies, the role of policy and systems of political organisation in defining the market conditions of textbook production. We elaborate on policy influence here: specifically, on the clear benefits of policymaker commitment to supporting the development of quality learning materials, on degrees of centralisation and state regulation, on national policy narratives on textbooks, and the political economy of textbook production.

Policy and political organisation

We briefly examine here the implications of different levels of curriculum control, and different traditions of political control in education, on textbooks. State control over textbooks can vary widely, and the countries examined in this report exert different degrees of control over learning materials. Some don't mandate textbooks at all, or indeed don't make financial provisions for textbooks. The countries covered in this review also exhibit vastly different traditions of national and local control over education systems, and have education systems that have developed in different ways and at different rates. Andy Green's (2013) comparative study of education and state formation analyses the uneven development of national education systems in the West in the 19th century, demonstrating how Austria, France, Prussia and some German states developed national education systems early, while England, Italy and southern US states developed their systems relatively late. Green's analysis illustrates that globalisation creates a trend towards policy convergence in education, with education becoming increasingly internationalised and a growth of policy borrowing between states is clearly evident (p. 2). However, his analysis also notes that national education systems *themselves* are not disappearing, and can be seen to resist convergence, as education is one area at least where national governments often still seek to pursue national policies.

Green's analysis, in addition to other historical sociology scholarship on the development of education systems (see Archer, 2013) has done much in both documenting the development of different systems and traditions of political control in education, and how these have driven or shaped education policy interventions. For instance, Margaret Archer's (2013) analysis of the development of decentralised and centralised systems notes that there is a greater complexity of interaction in decentralised systems, and various processes through which interest groups can induce educational change (p. 393). Countries such as France and Japan find themselves on one end of the 'centralisation continuum', while the US presents as a unique case in being highly decentralised with a long-standing tradition of putting control of education in the hands of local decision-makers (as opposed to national or even state-level decision-makers) (W. H. Schmidt & Prawat, 2006). US education stakeholders thus demonstrate far stronger opposition to forms of state centralisation. In England, 'europeanising' measures such as the national curriculum and national testing meant that England's education system became more centralised in terms of government control over curriculum and assessment after 1988, but retains system peculiarities such as individual institutions enjoying a large degree of autonomy (Green, 2013). At the same time, there are examples of 'mixed models' in textbook policy including in the Republic of Korea, Singapore and Taipei (China). Our analysis furthermore does not suggest countries demonstrate a single direction of travel. There are, for instance, several countries in Asia, Europe and sub-Saharan Africa that have *re*centralised textbook publishing (Smart & Jagannathan, 2018).

Yet, we know from solid empirical evidence that the role of (de)centralisation and degree of curriculum control in education outcomes is not self-evident, and resists simplistic analysis. Drawing on data from 37 countries, Schmidt and Prawat's (2006) paper ('Curriculum coherence and national control of education: issue or non-issue?') concluded that although greater focus and rigour in the curriculum is a common characteristic of high-performing nations, national control of the curriculum is not a requirement for achieving greater curricular coherence. The authors instead emphasise *function* over location, and in particular 'authoritativeness' or credibility – a consensus or acknowledgement that someone has the 'final say' on crucial issues in education – as being a major component of policy effectiveness (p. 654). In many countries 'policy instruments' (e.g. textbooks, standards, assessments) do derive their authority from national institutions, where this has resulted in a positive correlation between national control and curriculum coherence in countries such as Japan and France. In these countries, pronouncements by national decision-makers are taken seriously as education ministries are widely perceived as credible voices of authority on education policy.

However, centralisation does not characterise systems in all countries where greater curriculum coherence – and the reflection of this coherence in key policy instruments – has been achieved. Schmidt and Prawat's (2006) study has been critical in emphasising credibility in curriculum governance as important rather than the location of curricular authority, where credibility is defined by the authors as the 'ability to speak with enough authority and with enough clarity to inspire action and belief on the part of teachers' (p. 657).

Different systems and traditions of political control in education still produce significant variation in policy approaches to textbooks, as we have seen elsewhere in this review (see section on Governance). Mexico's funding and approval system for textbooks is open and permissive, with schools given freedom to select textbook publishers from an extensive list. This essentially reflects the Mexican government's focus on increasing students' and schools' access to textbooks as a first priority, rather than applying controls on textbook selection in schools. Some countries such as Poland have rapidly invested in textbook provision over a short period, reflecting a broader significant increase in public expenditure on education. In Poland, market restructuring accompanying this series of changes since 2014 has resulted in a shift to state-funded textbook purchasing in most phases, with the Polish state setting criteria and approving books, and where textbooks are owned by municipalities instead of parents or students. Centralised textbook systems are also common in Central and South Asian countries such as Bangladesh, India, Nepal and Sri Lanka: these systems have similar characteristics with a key feature being that textbooks are free of charge and cheaply manufactured (Smart & Jagannathan, 2018). Criticisms of devolved textbook policies often include that the profit motive drives up textbook prices: in comparison, a centralised policy has allowed governments in Vietnam and India to supply millions of textbooks to schools in an efficient, cost-effective way.

Textbook control can also at times be linked to state-building and related efforts to control the national narrative. The case of textbook controversy in Japan, and the influence of the Ministry of Education ('Monbukagakusho') therein, stands out as an extreme example of state control over textbooks. Nishino (2008) illustrated that between the period of 1945-1995 Monbukagakusho gained gradual but complete dominance over the screening and distribution of textbooks in Japan. The structure of the Japanese textbook industry took on a part-private, part-public form. Teachers were given a performative role in the selection of textbooks by choosing texts from an officially sanctioned list (Crawford, 2006). Publishers were given guarantees of textbook purchase, however content had to adhere strictly to the Japanese national curriculum, and, combined with the heavy bureaucracy surrounding textbook regulation, the diversity of textbooks or the renewal of narrative and pedagogy was effectively discouraged (Nishino, 2008). As Crawford (2006) argued, Japanese textbooks reflect the 'intensity of conflict over the construction of official knowledge in Japan' (p. 51), and are in themselves reflections of national policy imperatives.

Textbook revision following political regime change has been noted elsewhere as being based on the need to forge a renewed national identity and national values. Transitions from centrally-planned economies in several former USSR countries resulted in textbooks being perceived as key tools in new regimes' efforts to make a clean break with former rule. In Azerbaijan, while government concerns about textbook quality partly drove revision, a key policy goal was to ensure that the new textbooks instilled nationalism (Kazimzade, 2008). Other studies have also demonstrated that textbooks and learning materials in history and civic education have been key tools policymakers have deployed in the promotion of national identity and in the forging of a national historical narrative (see Gopinathan, 1989; Lidher, McIntosh, & Alexander, 2020).

Policymakers thus shape the nature of discourse on learning materials, where perceptions on textbooks are also prone to narrative shifts. This is for instance evident in the case of Sweden and the evolution of a Swedish national policy discourse on the merit of textbooks. Johansson's (2006) research documents the historical development of policy discourse on textbooks in Sweden, observing a preoccupation among policymakers in the 1940s on the perceived high dependence on textbooks, considered to be an obstacle to the 'development of a democratic school' (p. 7). Educational authorities in Sweden have remained divided on the merits of state approval of textbooks: while textbooks in Sweden were subject to government regulation between the 1930s-1992, there is presently no state control or evaluation of textbooks in Sweden (Johansson, 2006).

Evidence from different national case studies suggests that close collaboration between decision-makers and other stakeholders carries benefits. The case of massive consensus-building on textbook quality among Finnish stakeholders is an effective illustration of this: while Finland operated a system of state regulation over textbooks in the 1970s and 80s, the early 1990s saw the Finnish government take the decision to remove the textbook approval system and rely instead on publishers' capability to produce learning materials based on the curriculum. Yet, the preceding tradition of stringent regulation of quality has had a lasting effect; combined with effective consensus building among stakeholders and in particular publishers, this has kept the quality of learning materials high. The Finnish Agency for Education works with teachers and publishers in a 'climate of trust' on curriculum development, and publishers compete to develop resources from which teachers select the best materials (Taylor, 2019, p. 5). This has in turn had a positive effect on learning (Menntamalastofnun & Cambridge Assessment, 2019). In Sweden, a publisher-led push for quality textbooks has resulted in more enthusiasm among decision-makers about the role of textbooks in the education system (Menntamalastofnun & Cambridge Assessment, 2019). In Ivory Coast, the government's efforts to encourage competition in the educational market by guaranteeing a choice of three textbooks per subject, freely available to pupils, has resulted in the growth of publishers' investments and the growing success of local publishers against international competition (Taylor, 2019).

There are other instances where governments have changed course on textbook regulation resulting in a positive impact on quality. In 2001, Singapore shifted from a highly centralised approach to one of textbook authorisation, which yielded positive outcomes. However, in other instances, a stated policy commitment to improving textbook quality may fail to materialise in practice, such as in the case of Azerbaijan's efforts at textbook reform in the period of post-Soviet transformation where subsequent mechanisms to ensure quality were not put in place (Kazimzade, 2008). A policy shift may otherwise fail to be coherently implemented: this is evident in Bangladesh, where textbook publishing for secondary school grades 6-9 experienced a limited privatisation drive in 2004-2008, however the subsequent bureaucratic response to this privatisation initiative was mixed (Smart & Jagannathan, 2018). While the government supported the policy and took steps towards its adoption, the continued allowance for the National Curriculum and Textbook Board of Bangladesh to publish its own textbooks proved an impediment to privatisation (Asian Development Bank report 2015, cited in Smart & Jagannathan, 2018, p. 23).

Political economy

We have noted that the political economy of textbook production has an important, but often implicit effect on textbooks and their development. It was concluded in Section 8 that the conditions of policy, governance and market dynamics under which textbooks are produced can differ substantially between countries, but nonetheless shape both textbook content, quality, and their use. We examine more closely in this section how textbook publishing is highly dependent on economic and cultural factors and conditions, including cultural reproduction of knowledge. As such, the state's power to define the field of education and the specific knowledge disseminated in schools is not absolute.

Höhne argued that the power to define educational media involves not only the control and approval of textbooks, but also the political control of the textbook market (T. Höhne, 2018; Jiménez & Campos, 2010). Analysis from recent studies allows the identification of the following areas of political economy impact on textbooks:

- **Greater market concentration** – There is an 'observable tendency since the 1990s' (Höhne, 2018, p. 118) towards market concentration in the textbook markets of Germany, the US and Canada, particularly in the increase in monopolies and oligopolies. For example, the German textbook market has seen a drastic decrease in the number of publishers whereby textbook publishers that held a strong presence in the German market in the early twentieth century, such as Diesterweg, Oldenbourg, and the East German publisher Volk & Wissen, have been integrated into three big players (Macgilchrist, 2017). Centralisation in traditional textbook markets is however accompanied by *decentralisation* in the availability of open, or cost-free, digital educational resources, with an increasing number of other organisations and individuals – charities, churches, teachers, non-profits and for-profits – involved in the

production of free digital educational materials (Macgilchrist, 2017; see also Section 12 of this report).

- **International competition and product diversification** – Globalisation pushes publishing houses towards product diversification, and traditional publishers are pushed to offer a broad and diverse range of digital learning materials and products. Traditional textbook publishers are increasingly operating as general service providers, offering an extremely diverse range of digital products and services (Höhne, 2018; Jiménez & Campos, 2010; see also Section 12). At the same time, product diversification has been accompanied by content standardisation. We noted in Section 8 that market forces have produced a tendency towards standardisation and therefore homogenisation of textbook content, as publishers adopt risk averse strategies and avoid deviating from 'verified' content that has already been successfully marketed.

- **Economisation** – decreasing net profits from traditional learning materials have led to intense efforts at greater efficiency, economisation and the shortening of production cycles, including more aggressive timelines for textbook authors and producers. The rise of 'publisher-led' initiatives for textbook projects, increasing pressure on authors to accept lower fees or royalties, and the decreasing financial incentives for experienced authors are all indicators of economisation efforts (Zemach, 2018; Section 8, this report). More broadly, the field of textbook publishing is increasingly dependent on innovations and the ability of publishers to adapt to changing environments and changing markets.

- **Differentiated professionalisation** – Risk minimisation strategies of publishers mean that these now focus more explicitly on the needs of future customers. Höhne (2018) notes that this has produced more labour specialisation in production, and an expanded cooperation with freelancers.

Influence of political interest groups

The political economy of textbook publishing in South Africa before 1994 is an example of a textbook publishing industry heavily marked by the influence of political interest groups, and in this case the state's apartheid apparatus. New publishers faced significant difficulties entering a market dominated by a small number of publishing houses and in selling textbooks that were alternatives to the mainstream (Siebörger, 2006). Schools were intended to have autonomy in placing textbook orders from an approved list maintained by each education department, but in practice, this was also often done at the departmental level. As Siebörger (2006) observes, this resulted in a situation where textbooks of quality were produced but often not purchased in any great numbers (p. 238).

Socioeconomic status and demographics – market rationales

Specific socioeconomic or demographic characteristics have also been shown to have an impact on the production of textbooks in-country, and in some cases produce a reliance on externally produced textbooks. Low-income countries and countries with limited markets for instance struggle to facilitate in-country publishing, as noted in Section 8. This is further illustrated by Blasi's (2018) analysis drawing on a 2008 World Bank report on textbook publishing difficulties in sub-Saharan Africa. Blasi concluded that relatively small student enrolment numbers (especially at secondary schools), widespread low parental purchasing power, and ad-hoc sources of government or donor funding for secondary textbooks together constitute a market of only marginal significance (Blasi, 2018, p. 87). One consequence of this is that there is little incentive for investment in new textbooks for specific countries. This finding is similarly reflected in Gerard and Roegier's (2009) assertion that economic constraints such as a small population and weak purchasing power push the per-unit cost of textbooks up to unprofitably high levels.

Market logic can also shape textbook production in high-income countries. This is the case for market influence on textbook production in Germany, where German states with proportionally more students command more of publishers' resources and attention than states with smaller populations of school children (Macgilchrist, 2011). We noted furthermore in Section 8 of this report that publishers in the US are influenced by the requirements imposed in key textbook 'adoption' states such as Texas.

Reflections

In this section, we discussed impact of textbook use; research impact on textbook quality and use; and policy impact on (conditions of) textbook production, quality and use.

Different studies have determined that *impact of textbooks* must encompass the ways in which textbooks are actually used in practice. However, the overview of the state of research on textbook use revealed some important gaps. Predominantly, studies on use have focused on teachers' perspectives of textbooks, and observations of the ways textbooks are used by teachers in the classroom as a pedagogical tool. Comparatively less is known about pupils' use of textbooks, and pupils' perspectives on learning materials, where exceptions remain limited to specific themes (for example, studies of pupils' use of digital learning materials). The cultural factors shaping patterns of use in different local and national contexts remain similarly obscure, and limited to a few studies. Finally, it was determined that physical features of textbooks also shape patterns of use, where this emerges as a promising area of research that warrants further investigation.

This section noted that in the domain of social research, there is increasingly an expectation for research to have economic and social value. Nonetheless, not all research on textbooks is policy-oriented in a way that concrete recommendations for policy and practice are generated or can be deduced. We noted however that the potential for high quality research to produce opportunities for lesson-learning can still be significant.

Policymakers have a critical role to play in determining the uptake of research to inform subsequent policy on textbooks. States exert varying levels of control over textbooks, where different political rationales and over-arching policy goals are key factors in steering textbook policy. While international organisations such as the OECD and the World Bank have made statements in support of devolvement to local authorities and greater school autonomy, linking this to high performing education systems, this is not to say that centrally planned education systems cannot lead to high-quality textbooks and quality in learning outcomes when other threshold factors are in place. This was illustrated effectively in Singapore's involvement of highly experienced teachers in the development of curriculum and textbooks, building on a deep understanding of pedagogy and learning (Smart & Jagannathan, 2018). Finally, within the policy landscape, the political economy of textbook production, and the influence of powerful interest groups emerge as crucial factors mediating textbook production, quality, and use in different countries and contexts.

12

Paper vs Digital

‘The future is digital’ – a statement of truth or intention?

Reviewing the digital learning field

In writing this vital section of the review, we have paid great attention to the nature of our commission. It might be expected that we catalogue the many case studies of apparently successful use of digital resources (for example: Jönsson, 2005; Skordis-Worrall, Haghparast-Bidgoli, Batura, & Hughes, 2015; Stork, 2018). There are of course robust and evidence-based digital resources readily available – the *Brilliant* platform for maths and physics (USA, for profit); *Sparx* platform and allied tutoring for maths (UK, for profit); *Isaac Physics* which stimulated allied question books and textbooks (UK, Government-assisted); the highly innovative *Ludenso* platform which allows digital overlay to paper texts (Norway, start-up); *Google Classroom* (USA, for profit); *No More Marking’s* application for comparing and assessing writing (UK, for profit); and innovative support such as the haptics work in medicine and dentistry at *Imperial College London* (UK, public and private funding). But we list these here to illustrate the range of digital applications which are available: these are simply a selection of the applications with which we are particularly familiar. It is an extraordinarily crowded field, with highly partial and scattered research. This section does not attempt to review research in order to identify the ‘best’ applications, or encourage use of specific application. Rather, what the section focusses on are issues of the state of the market, patterns of use and impact; and the means by which consumer choice and research enables quality applications to be identified and adopted – or not.

There are good reasons why we do not here simply catalogue apparently successful adoptions. Firstly, the review of research indicates that it is not enough to try to replicate specific instances of adoption without understanding the conditions which made that adoption successful. Some descriptions of successful implementation do begin to explore the school conditions which underpin successful implementation (OECD, 2008; Pitler et al., 2012; Raspopovic et al., 2014) but the wider system conditions and the means of selecting digital materials are not included, despite this now being fundamental to the field. This introduces the second reason: this research review is highly strategic in aim. A narrow focus on successful instances of implementation does not help understanding of the nature of the market in available materials, the huge variation in the form of digital materials, the challenges in reviewing and selecting digital materials, and shifts in governance and control.

To support effective public policy formation and action by schools, the review confirms the differences in function between paper-based and digital materials – establishing that the differences are profound. We conclude that no simple ‘one is better than the other’ proposition is justified by the research, and that policy makers and educators need to pay attention to the unique pedagogic functions and qualities of each, and absolutely must pay attention to the structural economic differences in market structure and locus of control – issues which we also outlined in the governance section of this review.

The strong impulse for adoption in rhetoric and popular culture

Press comments and statements from pundits/opinion formers now universally refer to the existence, possibilities and ‘promise’ of digital materials (Saari & Säntti, 2017) including Richard Culatta’s notorious ‘scrap textbooks by 2020’ (Daily Mail, 2015). The future ‘ubiquitous’ use of digital learning applications frequently is portrayed as ‘inevitable’, ‘a rising tide’ – all statements which suggest that the adoption and widespread use of digital resources and learning material is almost independent of human agency.

We readily can theorise the nature of these statements since the doctrine of ‘historical inevitability’ is neither new nor unusual (Flew, 1981).

By downgrading the role of the deliberate actions of individuals and institutions (such as the State) in shaping society and economy, the interests of individuals and groups can be served beneath the cover of ‘ineluctable historical forces’. Whilst raising the issue of unstated interests has the paranoid

feel of ‘conspiracy theory’, the problematic rhetoric of ‘inevitability’ and ‘undoubted benefit’ has featured in many phases of history and around many issues and developments – and increasingly is contested, not least within discussion of degradation of the natural world (Surowiecki, 2007; Wolf, 2020).

If we construe digital learning as delivering ‘public’ and ‘private’ goods – ie that they carry advantage – then we should consider all of the possibilities for the actions of producers and consumers - to ensure that we understand those goods, that these goods genuinely are available, that benefits outweigh disadvantages, and that the disadvantages are both fully recognised and can adequately be mitigated. In other words, the sum of decisions over supply, over choice, over regulation and restriction, and monitoring benefit and detriment should add up to overall benefit, with known and mitigated downsides.

To illustrate often ignored downsides, Kyle Devine’s startling analysis of the political ecology of the music industry shows a massive increase of CO2 emissions resulting from digital downloads and streamed music, with the emissions balance being in favour of CDs for repeated listening – a counterintuitive finding, but well validated in Devine’s research (Devine, 2019). The same form of ‘hidden’ issues apply to mass supply of learning materials.

This section therefore attempts to critically analyse the public and private goods which digital learning materials present, and the means by which this can be realized. It suggests that deliberate public policy and action by schools and individuals is essential to realise benefit. We emphasise agency and informed action. We trace evidence regarding clear differences between paper and digital learning materials and do not lapse into a naïve polarized position regarding paper being ‘better’ than digital, or vice versa. In reviewing public discourse, we have concluded that the nature of public discourse has some very problematic elements: biased discourse, overselling and overclaiming is bad for digital provision. It obscures the importance of an evidence-based appreciation of the respective merits and demerits of paper and digital.

To help more evidence-informed discussion, we explore these differences in detail; wide ranging review of the evidence strongly suggests that they are different, and have different features and a different balance of advantages and disadvantages. To explore these we look at the empirical work from psychology of perception and learning. We look at production processes and quality assurance arrangements, including market forms and the possibilities and form of direct and indirect regulation. Our analysis of market form suggests that the market in digital materials is characterized by information asymmetries, which causes market imperfections and prevents a powerful drive towards quality.

Classification of learning materials may seem an arcane and obscure need, but it is a key factor in market dynamics. Classifying digital materials is challenging, yet it is essential. Understanding the precise functionality and patterns of use associated with each digital product determines the extent to which benefit can readily be identified and attributed to it. We explore the extent to which the huge diversity of digital products has impeded the development of clear classification and understanding of benefit. For analogy, think of the difficulty of purchasing food and domestic products in a large supermarket in which there is no classification of items, nor rational positioning on the shelves, nor any facility to see what is inside the packaging. There is a reason why advanced markets include regulated labelling and quality control of essential commodities (Bancarella et al., 2015; Bonroy & Constantatos, 2014).

Whilst we explore the impact of rising societal use of digital devices, we certainly do not conclude that the selection and use of digital resources in education assumes an ‘inevitable’ course, underdetermined by well-grounded evidence-driven public policy.

On this, a note: the degree of autonomy to be given to schools is an area of considerable discussion at present. Our analysis elsewhere in this report shows that in past decades, in a range of high performing systems, national textbook approval was an important dimension of public policy regarding quality control of education. In some nations this continues to be the case. We see no reason for digital materials to somehow be intrinsically out of scope to public policy decisions and discussions on what schools should be using to enhance equity and attainment.

Understanding the emerging field of 'digital materials' – form and impact

Some interesting perspectives from research and commentary:

- Young people prefer to read on screen
  (Clark & Picton, 2019)

- Plot sequence recall is depressed with on-screen reading
  (Mangen et al., 2019)

- A digital focus on reading and learning has implications for brain function, attentiveness and critical thinking
  (Wolf, 2018)

- Less than 20% of teens in the USA report reading a book
  (Twenge et al., 2018)

- Digital recording, verbatim note taking is worse than taking no notes at all – laptop notes inferior to written longhand notes which score best regarding learning measures
  (Mueller & Oppenheimer, 2014)

- Cognitive test scores comparable but not identical when comparing digital and paper versions
  (Björngrim et al., 2019)

- Digital learning environments need deliberate enrichment to counter loss of affective elements
  (Näykki et al., 2019)

- Long, high stakes test scores are depressed on-screen due to cognitive load and familiarization effects
  (Wästlund et al., 2005)

- Reducing difference between digital and paper tests as screen quality and accommodation of digital grows
  (Noyes & Garland, 2008)

- Tendency to short-cuts and once-only reading when reading digitally
  (Liu 2012)

- "…the implicit feel of where you are in a physical book turns out to be more important than we realized…"
  (Abigail Sellen, cited in Jabr, 2013)

- There is a tendency to print out e-books for further reading
  (Wu & Chen, 2011)

- Studies of diverse learners' use of new media cast doubt on the speed and extent of change
  (Warschauer, 2007)

If we accept the diversity of forms of digital resources and variation in the manner and context of their application, we no longer read this selection of studies and analyses to find out whether in some simple way paper is better than digital or vice versa. We read these ***to understand the differences*** which are associated with each.

The studies point unequivocally to differences between paper-based and digital materials:

- Different outcomes
- Different cognitive demands associated with using the resources
- Different forms of stimulation and motivation
- Different behaviour and attitudes to resources and the tasks they require
- Different implications for long-term brain structure in young people and behavioural tendencies

These derive partly from complex human-object interactions, partly from the characteristics of the materials themselves, and partly from the patterns of use and the context in which they are used.

Baydas et al. (2015) reviewed educational technology research trends from 2002 to 2014 through content analysis of 1255 articles published in two leading educational technology research journals, the British Journal of Educational Technology (BJET) and Educational Technology Research and Development (ETR&D). They identified the major themes present in the literature as:

- Learning approaches/theories
- Learning environments
- Educational technology research (including areas such as acceptance and policy)
- Online learning
- Assessment/evaluation studies
- Instructional design

Their systematic review concluded that '…learning approaches/theories and learning environments were the subject most preferred by researchers…' (op cit p. 1). They noted that '..very few articles have examined governmental or institutional policies, plans for the wider adoption of ICT or the broader issues of change and innovation…' (Baydas op cit p. 14). Meanwhile, our own research and work with policy makers (including work at the First and Second International Summit on Textbooks) suggests that this area is one which is essential for ensuring that the market in digital learning materials is one in which there is a drive for quality, access and sustainable supply. In this section we argue that knowledge asymmetries in the market prevent a market dynamic which drives towards quality, and that issues of scrutiny/approval and selection are both challenging and profoundly under-researched – yet essential to the future of high quality digitally-supported learning.

Explaining contradictions in impact studies

As stated above, digital educational resources most frequently are presented as a 'transformation' of existing learning. Estimates of the number of applications, and of the size of the global market are subject to massive variation, depending on what kinds of applications are regarded as 'educational', whether Higher Education is included, whether professional learning is included and so on. The commercial sensitivity of market share and sales figures contributes to the lack of transparency. The impact of the switch to on-line learning during the pandemic is yet to be quantified. However, for indicative purposes, Global Market insights estimated in 2020 that the eLearning market size 'would exceed' USD 375 billion by 2026 (Wadhwani & Gankar, 2020), with over 250,000 education-focussed applications available.

There is evidence of extraordinarily wide-ranging changes in respect of:

- classroom practices by teachers
- patterns of learning by young people

- purchasing patterns by schools
- provider organisations/publishers and market structures

Analyses frequently focus on 1. and 2. They also often present the 'transformation' of learning as entirely positive (for example as 'desirable disruption'), and as inevitable. We believe neither of these assumptions are correct. For our analysis here; we wish to assert the following essential 'framing' of the discussion of the provision of digital learning materials.

- **Variation in the forms of materials** Assessment focussed, learning focussed etc;

- **The patterns of adoption and integration** into learning programmes

- **Recognition of the impact of digital** including impact on established high quality elements of existing arrangements**,** and the impact of changes in social and individual behaviour resulting from digital

- **Criteria for judgement of the acceptability and success** of digital materials

- **Locus of control** Youtube locus - with teacher; learning platform - cedes certain forms of control to teachers; etc

- **The nature of markets, governance, and public policy formation** around digital materials, including sustainable supply

Interpretation of research on the use and impact of digital devices and applications in education is highly problematic. There has been little systematic research on classifying the forms of technology available, nor on understanding the interaction between different forms of technology, patterns of use and educational outcomes. While there are many case studies of specific applications of technology – both hardware and applications – the efforts to generalize in order to establish benefit and deficit have been hampered by this lack of a general framework for explaining impact.

Steven Higgins, undertaking a systematic review for the UK's Education Endowment Foundation (EEF) states:

> *Evidence rating. There are 32 meta-analyes and quantitative syntheses all suggesting a positive impact of digital technologies on pupil's learning. 20 of these have been conducted in the last 10 years. However, there is a very wide range of focus across these different meta-analyses, including on particular technologies (eg laptops or digital games or intelligent tutoring), particular curriculum areas (eg reading or mathematics), and particular countries (eg in Turkey or Taiwan). There is also considerable variation in the technical quality of the meta-analyses. The variation in effects is also very wide (from 0.16 to 1.6) making it difficult to draw out specific messages. Average impact has remained relatively consistent over time suggesting that the general message of moderate positive impact is likely to remain relevant. Overall, the evidence is rated as extensive.* (EEF, 2021)

The substantial systematic 2015 literature review commissioned by the Scottish Government and undertaken by ICF Consulting Services reached more positive conclusions (Scottish Government, 2015). Its review criteria yielded 217 studies for detailed review, from 950 source documents. Around 60 yielded evidence related to the key themes of the review: raising attainment, reducing inequalities, improving transitions into employment, improving efficiency of education, and enhancing parental engagement. The report emphasises:

> *Conclusive evidence for improvement of attainment in primary and secondary education in maths and science, and writing and comprehension.*
>
> *Indicative evidence of benefit in specific support to those at risk of low attainment.*
>
> *Promising evidence in respect of (i) enhancing transition through both building skills in collaboration, leadership and 'critical thinking', and the practicalities of developing knowledge*

of work and career pathways. (ii) improved efficiency of teachers in preparation work; (iii) enhanced communication with parents.

But it is important to note that the report's conclusions regarding benefit emphasized the concerted and consistent actions of teachers and schools and not the characteristics of the digital resources: for all categories of enquiry in the review, the pedagogic skills and knowledge of teachers and school policy (e.g. action in contacting parents) was emphasised as being crucial in yielding positive benefit: "…successful utilization of digital technology depends not just upon access to equipment, tools and resources, but also on the availability of sufficient training, and knowledge and support networks for teachers… (Scottish Government, 2015, p. 3).

Two further findings are important. Firstly, the extent of benefit was identified as being 'similar to other changes to pedagogies which are effective in raising attainment, although the use of digital learning has other benefits'. Secondly, that the mechanisms for improvement in some areas (enhanced engagement of parents, increase in learning time through learning at home) underpin improvement in initiatives which are not uniquely associated with the use of digital tools. The detailed analysis in the report – although not the summary conclusions – also emphasise key characteristics of learning approaches such as clarity in learning aims, specificity of learning outcomes and focus upon them, and effective identification of learners in need of support. These all are highlighted as present in high performing systems (Crehan, 2016; Schmidt, 2018) and are not uniquely associated with technology-based or technology-supported learning.

This sets a wider and deeper public policy scene for successful use of digital in school settings: concerted and coherent action is required on professional development and school action in order to yield benefit.

These include:

- Training and support – not only to use equipment but to exploit digital tools and resource for teaching
- Overcoming teachers' anxieties about digital teaching, not just about the use of the technology but also the use of different learner-centred pedagogies
- Allowing teachers to experiment with technology
- Networking with other teachers and schools
- Maintaining and upgrading equipment and using tools that are compatible across many systems

(Scottish Government, 2015, p. 3)

This assertion of benefit being dependent on teacher practice and school policy helps with the explanation of the highly contradictory nature of the global evidence on the impact of deployment of digital learning resources, and the naïve generalisation present in many of the rhetorical claims. If technology yields benefit due to the presence of deeper and wider educational practices, then benefits are unlikely to be yielded when such practices are not in place.

For example, Veli Batdi's metastudy (Batdi, 2015) of 78 studies in maths and science across all phases of education (12% primary, 54% secondary, 15% high schools and 19% HE - all of which met the criterion regarding pre-test and post-test control groups) found a large, positive and significant effect size. It is a robust study, which includes recommendations for further investigation of 'other variables such as attitude, retention, and success' and analysis of use of different types of device (Batdi op cit p. 1281).

But since we have the cautionary research from Finland regarding declining equity with increased use (Saarinen and the OECD's concerns) we need to be extremely cautious about Batdi's grand conclusion:

> *As a result it can be seen that the effect of CBT in terms of academic success was high and more successful than traditional teaching methods'. No so…only in the contexts of the study. It is a robust study, but over-reaches itself in terms of a general conclusion. Indeed, OECD noted from the 2012 PISA data that use of digital devices continued to increase (by 4 percentage points 2009-12 across 29 OECD countries with available data) but with the continuing finding that '…mathematics proficiency tends to be lower in countries/economies where the share of students who use computers in mathematics lessons is larger …* (OECD, 2015, p. 149).

The authors continue:

> *…across countries and economies, the amount of ICT resources available to students, as well as school systems' past levels of performance. The strength of the relationship weakens considerably when adjusting the level of ICT resources for the variation in per capita income across countries/economies, and becomes mildly negative when also controlling for the system's average performance in earlier PISA assessments.*
>
> *In fact, PISA shows that for a given level of per capita gross domestic product (GDP) and after accounting for initial levels of performance, countries that have invested less in introducing computers in schools have improved faster, on average, than countries that have invested more. Results are similar across reading, mathematics and science…* (OECD op cit p. 6).

While this was reported very starkly in various news outlets at the time, the stories did NOT highlight the caveats and conditions which OECD placed on its analysis:

> *…non-experimental, cross-sectional data such as those gathered through PISA, do not allow even sophisticated statistical techniques to isolate cause-and-effect relationships between computer access and use of computers on the one hand, and performance on the other. Patterns of correlation can be identified, but these must be interpreted carefully, because several alternative explanations could be given for the same pattern….* (OECD op cit p. 5)

All of this also needs to be taken in the context of the report's date of publication: 2015. Much of the data derives from a period before widespread use of tablet devices and the explosion in availability of educational digital materials.

Where does this leave us with interpretation of the overarching studies and the body of detailed work on use of digital learning resources? How do we interpret these seemingly vague and inconsistent findings?

There is a route through.

The high level, aggregate findings of studies such as the EEF study and OECD do not yield a picture that 'digital is always good', nor 'digital is always bad'. The reason for the mixed results derive from two key areas of variation: the variation in the digital applications themselves, and variation in the model of learning, learning practices and learning culture in which they are deployed. This is emphasised particularly by the OECD findings regarding the restricted (constrained) use of digital in high performing systems – the quality of the learning environment matters. These factors combined form a key explanation for the many informal accounts of effective implementation of specific applications and devices, and why higher levels of use of digital, unconstrained by well-managed learning models seems to yield disbenefit rather than benefit. It explains why some applications, informed by detailed and well-designed research, yield benefit for learners and schools using them.

The reports of disbenefit and widening gaps between learners need to be taken extremely seriously. Saarinen's (2020) work on increasing inequity with increasing level of use of educational technology

in Finland, and OECD's Andreas Schleicher's warning that '…technology seems of little help in bridging the skills divide between advantaged and disadvantaged students…' (Schleicher, 2015) adds to the proposition that it is the learning milieu in which technology is used which is a critical factor. Reinforcing this interpretation of the extant research, in further comment on the PISA 2015 findings, Schleicher states:

> *…the successful integration of technology in education is not so much a matter of choosing the right device, the right amount of time to spend on it, or the best software. The key to success are the teachers, school leaders and decision-makers who have the vision, and the ability to make the connection between students, computers and learning*… (Schleicher, 2016).

But the evidence suggests more than this. It is the set of learning practices, the learning model which is highly determining of benefit – both the model(s) present in the school arrangements, and in the digital materials themselves.

Batdi's study (2015) hints at an interesting issue – an increased positive effect over time. The diversity of the forms of applications and the diversity of the practices into which they are being inserted are an important dimension. For example, 'use of digital technology' can range from occasional and incidental use of materials such as video clips through to highly structured environments for authoring content, assessing attainment and 'routing' pupils through content. This gives rise to extremely complex and varied interactions, even within the same school, making it difficult to generalise about benefit. It is also difficult to reconcile statements from large-scale surveys about positive benefit and the advantage with research on the impact of use of digital devices on human behaviour and cognition, and the apparent impact of use of digital learning environments during global pandemic which, due to intervening factors, has not appeared to diminish inequalities, indeed it may have amplified them, and not solely because of issues of access to devices (Belay, 2020; Denoso & Retzman, 2021; Li & Lalani, 2020).

Digital provision and issues of public policy

As stated in the introduction to this section, the digital world is definitely a product of human activity, yet future trajectory of development of this spectacularly complex, interconnected global set of arrangements frequently is presented as 'inevitable' – as if independent of human thought or intention.

This is intimately bound up with issues of control – if the future of digital arrangements are in scope to human decision, just whose decisions? Many in the technology industry itself are highly ambivalent towards government decision-making and restriction/regulation (Furman 2020; Scott 2019), yet where digital provision meets education, it immediately butts up against something in which the State – 'big' or 'small' – has a profound history of interest: the shape, depth and breadth of education for young people (Green, 2013; Oates, 2010).

As Selwyn and Facer argue, 'there is neither an inevitable "technological future" to which schools need to adapt, nor a set of universal technological impacts from which young people need to be protected' (Selwyn & Facer, 2013, p. 9).

In considering the changes in learning behaviour and practices which are associated with the use of digital materials, we believe it also is important to consider the changes in young peoples' behaviour induced by the use of digital applications in their social and personal lives. There are strong indications that social relations, reading habits, attentiveness all have been affected by the use of devices and applications (Burnett, 2016; McFarlane, 2019). This both affects the preferences and tendencies which they bring to formal education and presents modern education systems with a challenge – are the changes which are currently occurring consistent with the ***aims*** of education?

Most contemporary education systems aim to achieve both breadth and depth of education – attainment of deep understanding across a wide range of disciplines. Strategies to achieve this are not uniquely associated with increased use of digital resources. England's significant improvement in its international standing in maths and literacy in primary education (Oates, 2021) derives from

carefully designed interventions which focus on highly evidence-based didactics, not a wholesale introduction of technology. The use of high-quality paper-based resources, allied to carefully structured professional development was a feature of both areas of intervention.

By contrast, championing the key to reform, Presidential adviser Richard Culatta's presentation in London in 2015 emphasised a series of putative assets of digital learning resources: 'textbooks are outdated, they are in a form which is not adaptable, and for students learning in other languages they can't press the word and get a definition…', '…it is easier to get students to engage with interactive digital resources…', '..digital resources suit learners who do not want to learn in a linear fashion…'. He concluded by arguing that '…some schools have gotten rid of the textbooks very quickly. Others take longer. I would say within a couple of years in the US..I would hope in the UK too….' (Daily Mail, 2015). His presentation was typical of many statements on digital materials – it emphasised difference between paper and digital materials, presenting all those differences as assets, and all assets on the side of digital. This exhibits four forms of bias: availability bias or recency effect (emphasising recently acquired perceptions/knowledge and ignoring prior knowledge); framing bias (characterising a problem without taking all information into account); confirmation bias (actively seeking information which fits with a pre-existing schema) and 'bandwagon' bias (aligning with an emerging movement without attention to the evidence around the issue) (Haselton et al., 2015; Klein, 2008).

The statements were correct, in that the difference between paper and digital should indeed be emphasised - since the research clearly indicates substantial difference in function, processes and outcomes. The statements were incorrect – leading to an ill-founded recommendation of active rejection of paper-based materials, since continuing research on these differences does not present an unambiguous picture of paper=negative, digital=positive. The picture is far more nuanced, and the policy implications therefore are different to those presented.

The landscape of 'difference' was mapped comprehensively in an early (2002) analysis by Abigail Sellen and Richard Harper in 'The Myth of the Paperless Office', published by Massachusetts Institute of Technology (Sellen & Harper, 2002). Sellen and Harper's analysis touched on interesting problems, such as e-mail causing a 40 per cent increase in paper consumption (2002, p. 13) and the important issue of the relative 'affordances' of paper and digital artefacts:

> *…The physical properties of paper (its being thin, light, porous, opaque, flexible, and so on) afford many different human actions, such as grasping, carrying, manipulating, folding, and in combination with a marking tool, writing on…* (p. 17).
>
> *The concept of affordance allowed them to compare the affordances of paper with those of existing digital devices. They can then ask what kinds of devices or systems would make new kinds of activities possible or better support current activities. They argue that paper will continue to play an important role: 'Rather than pursuing the ideal of the paperless office, they should work toward a future in which paper and electronic document tools work in concert and in which organizational processes make the most of both worlds (…)* (Sellen & Harper, 2002, p. 22).

Entirely in line with this when, in 2018, China announced its drive to ensure that the nation led in Artificial Intelligence, a key part of its strategy was a 33-volume paper textbook series for pre-schoolers, an allied AI e-learning platform; a nine-chapter AI handbook for high school pupils, with leading Chinese universities contributing further paper-based textbooks.

So called 'traditional' paper-based textbooks increasingly have been theorised and elaborated, with sophisticated and systematic use of information elements such as side bars, text-highlighting, sophisticated images, extension reading; inclusion of elements such as pre-assessment, varied practice activities and end-assessment; and feature organisation and content organisation using well-evidenced learning models (Oates, 2014). The 'traditional' textbook is no longer traditional. They not only curate knowledge and present it in an enable form, they encourage certain forms of activity such as extended and varied practice, support teachers in sequencing instructional programmes, encourage effective approaches to securing equity in outcomes, and so on. These we list comprehensively elsewhere in this review. Additionally, the boundaries between digital and paper have become highly blurred with the emergence of paper-based resources which are accompanied by

additional digital elements – the 'suites' of materials which we refer to earlier in this review: teacher handbook, pupil textbook, pupil workbook, linked on-line learning and assessment materials. But a major challenge in comparing paper-based and digital materials comes with the high variation in form and function of the things labelled as 'digital learning resources'. Comparison is simple when the digital resource comprises a pdf version of the paper-based material; essentially, paper rendered into on-screen version. But the domain of things defined as 'digital learning resource' increasingly includes an extraordinary range of items and instruments, making comparison of efficacy challenging.

It also is important to consider the PURPOSE of comparison. Most frequently, rhetorical comment around digital resources presents the comparison as one where paper and digital need to be compared for the purpose of rejecting one or the other as inferior. This is an extremely value-laden and biased form of comparison. Such comparisons often diminish the functions of paper-based materials and fail to reflect the diversity of forms of digital resources. It includes the idea of a 'winning side' or the exclusion of 'the other' – when education arrangements easily could accommodate and make systematic use of both. The arguments also reflect a rhetorical paradox: the known disadvantages of one are compared with the putative advantages of the other – an entirely unfair and misleading comparison. When balanced comparison is undertaken – justly described as 'scientific comparison' - of the characteristics and functions of each, then comparison of the respective benefits and deficits of each – there then emerges the possibility of well-evidenced advice to policy-makers and educationalists.

Evaluating impact – the issue of diversity of form and function

The diversity of forms of digital resources seldom is acknowledged in either meta-analyses or rhetorical presentations. Classification is exceptionally difficult, since digital resources frequently assume hybrid forms and possess functionality which is deeply built-in or deliberately excluded, such as facility to return to earlier work and to re-do assessment exercises. This includes functionality such as teachers being able to remotely view learner activity – including data on performance and progress, and real-time observation.

For this study and research which preceded it, the authors reviewed many hundreds of digital resources for form and function, noting the complex combinations which have emerged and the varying extent to which learning models were made explicit, and the varying extent to which they were grounded in evidence. Through discussions with ed tech developers, the construction of digital resources seem to include a large measure of intuition and experimentation – '…let's try this….'. Since the means of adjusting the form and operation of resources is easy, this fluid and 'agile' approach is both possible and frequently seen as an advantage by developers. In some cases it can lead to undertheorised materials, and in cases where little sophisticated and well-grounded evaluation is undertaken, lead to materials whose benefit is both poorly understood and simply unestablished. But, by important contrast, we have observed some developers who are agile in their approach, base their work on evidence-based models, and undertaken sensitive evaluation to detect proven benefit – swiftly withdrawing materials or versions which do not gain user-acceptance or are not of proven benefit – they systematically refine the features of their applications.

Illustrative of the complex forms and functions – from the simple to the complex - are the following, drawn from review work and development work in which the authors of this review have participated:

- Video and other digital resources not designed specifically as educational resources
- Digital rendering of existing paper textbooks as e-textbooks
- Digital rendering of existing paper textbooks with additional functionality such as inset videos, animations, 3D rotations, etc
- Entry of pupil-composed text and comparison with other examples of text
- Linear-sequence learning activities which include explanatory text, re-cap text and assessment

- Adaptive learning activities in which different 'routes' through later material is determined by performance on earlier tasks – some with the facility to go back and take another route, some with no facility to 're-route'
- Practice tasks, linked to other materials such as a paper textbook
- Enhancement activities, linked to other materials such as a paper textbook
- Simulation environments in which activities can be rehearsed and improved
- Assessment environments with or without score diagnostics and advice on learning/remediation of misconceptions and errors
- Environments which include or focus on remote tutoring and/or encouragement of social exchange between learners
- E-portfolio work management and evidence portfolio assembly
- Comparisons of learner work, including those with ranking and other assessment models
- Complex 'student tracking' systems which estimate ability from attainment or ability scores and produce predictive future grades for pupils
- 'Content neutral' platforms which allow the creation of learning and assessment resources by teachers
- Platforms with a wide range of curated content which can be drawn down by teachers to create 'tailored' materials

What is evident here is the complex 'layering', combination of functions, difference in expected learner response/activity, and variation in application performance dependent on subtle variations in hardware characteristics and application formatting. Simple classification which yields clear and useful differentiation between materials is elusive. The diversity is extraordinary, and multiplying. Research increasingly shows that minor changes in the appearance and operation of digital can have an impact on function and pupil outcome (OECD, 2008; Selwyn & Facer, 2013). To ensure quality, accumulation of understanding and the development of formal or informal standards, we need to understand the way in which specific digital resources function, and the way in which those functions link to elevated equity and attainment, and to other outcomes such as engagement and enjoyment of education and training (e.g. propensity to continue learning, propensity to engage in self-study).

Classification is an important part of developing this understanding – addressing the key questions: 'what it this thing, how does it work and what impact does it have?'

One key issue raised in early evaluation work in Singapore (work by Marshall Cavendish in 2012, cited in Fong, 2015) was the permeability of on-line resources. A parent exclaimed to the developers

> *…I used to be able to cook dinner and have my child working on a textbook whilst I cook. I knew what they were doing and could keep an eye on them. But with an iPad I never know what they are doing…and they maybe are just thinking about the next email about to come it, not their work…* (Interview, Primary Head Teacher, St Mary's School, Singapore, 2012).

This rich and profound observation raises many issues of attentiveness and patterns of concentration, the incentive context surrounding the learner and relationship with others, as well as the impact, on learning outcomes, of change of medium from paper to screen. But there are wider issues of 'permeability' – the link between young peoples' habits, preferences and cognitive development conditioned by general societal use of technology (McFarlane, 2019). In Burnett's 2016 review of digital learning in the primary phase, she states:

> *…they are central to many of the ways in which we form and sustain relationships, communicate ideas, and generate, share and distribute knowledge. They have become part of our social life, with implications for how we follow our interests and passions, the nature and extent of our participation in civic and political life, our relationship with the environment, and our position within multiple communities, local and dispersed. For many children digital devices and the possibilities they enable are threaded through everyday life from the earliest days, and their early experiences and understandings are patterned by technology use…much of 'children's out-of-school learning is electronic and beyond the reach of either parents or teachers'…In education, therefore, there is a need to explore the significance of the digital age not just in terms of preparing children for an uncertain future, but in ensuring they are confident, safe and discerning users of digital technologies now…. (Burnett, 2016, p. 3).*

In work on paper based materials, the authors of this review used 'underpinning learning model or rationale', 'information element analysis' and 'writing frames' tools for understanding form and function. But the mode and operation of digital materials requires something different. Early classification systems for digital materials now appear too simple, since they were derived early in the evolution of digital resources. Later classification systems now seem to supply overly-complex models, since they have tried to track the divergence and complex combinations of form and function evident in the huge population of things for we collectively use the single term 'digital learning resources'. We have returned to the categories we used for the analysis of paper based materials and expanded and refined this in relation to the specific character of digital resources:

- underpinning learning model or rationale
- control and participation patterns – by both teachers and pupils (background control automated or actual)
- domain structuring model
- functional elements
- learner activity requirements
- sequencing and routing model
- assessment model
- data creation and capture
- monitoring and feedback facilities
- collaborative and communication facilities
- ownership and access rights

It is worth considering what a taxonomy is. At a general level, it is a 'scheme of classification'. But this definition understates the ideas of 'unique allocation of things to a classification' with that allocation having clear purpose and value – for example, explanation of function or appearance. They can of course shift and evolve as they become applied – Linnean Classification yielded a highly structured means of classifying living organisms, based on shared functional and physical characteristics (originally the nested binomial classification of kingdoms, classes, orders, genera, and species). Even within this, some things such as the Duck-billed Platypus presented early challenge. Linaeus' original classification was extraordinarily valuable, yet has not survived in its original form – what are considered to be 'observable characteristics' has changed, and DNA sequencing has better supplied an understanding of evolutionary developmental relationships between organisms. The same is occurring with the necessary description of digital learning resources. Put simply, classifications are at their best when they have purpose, are systematic and consistent, and support purposeful activity. In the case of digital educational materials, helping us understand what they are, how they function, and what benefit and deficits they convey in education and training: another version of 'what works'. The example of the Linaean taxonomy suggests that any classification will change both as it is applied and used, and as the objects of classification develop in their form and sophistication. Complexity in the classification is induced by the way in which digital materials can combine different elements and operations/functions – some with carefully-restricted limited functions, some a complex mélange of operations/functions.

This contestation and evolution of classification over time is more than evident in the literature on digital materials. Berg et al.'s (2004) classification is very 'of its time',

- Drill and practice
- Multimedia
- Simulations
- Educational games
- Tools 1 databases and encyclopedias
- Tools 2 electronic performance support environments
- Tools 3 communication and co-operation environments
- Tools 4 new tutees

(Berg et al., 2004)

'The following interpretations of what a learning may be are noted:

- Any digital or non-digital entity for technology-supported learning
- Any digital resource used to support learning
- Any digital resource used to mediate learning
- A reusable digital resource built in a lesson
- Interactive practice exercise
- Small, stand alone unit of instruction
- An instructional component that includes instruction that teaches a specific learning objective and assessment that measures achievement
- A collection of 7+-2 components containing content, practice and assessment parts
- A content object with a pedagogical component
- Combined knowledge object and a strategic object representing a mental model to be developed by a learner through incremental elaboration
- Interactive digital resource illustrating one or more concepts
- Interactive visual representation

Based on these interpretations, a learning object many be: (a) an instruction presentation object (6,7,8 and 9 refer); (b) a practice object (5 refers; (c) a conceptual model, (10, 11 and 12 refer); (d) anything digital (2,3 and 4 refer), or (e) anything digital and non-digital.'

(Churchill, 2007, pp. 482–283)

The UK focused Quality Assurance Agency (for higher education) takes a different angle, categorising a mix of modes and processes:

- Online, virtual or digital learning
- Blended or hybrid learning
- Distance or remote learning
- Face-to-face, in-person, on campus or onsite delivery
- Social or physical distancing
- Students' digital experience
- Passive digital engagement/experience
- Supportive digital engagement/experience
- Augmented digital engagement/experience
- Interactive digital engagement/experience
- Immersive digital engagement/experience

(Quality Assurance Agency for Higher Education, 2020)

Few of these frameworks included learning environments for authoring and curating teacher-authored materials.

The lack of coherence in these different frameworks means that structure has not yet been brought to choice and decision-making at school level. Daniel Churchill's latest work on classification (Churchill, 2017) provides valuable linkage to curriculum and learning design – touching the issues we raise regarding learning models – but is not a widely cited text. In practice, both the development and selection of digital resources remains unconstrained by highly-evidenced concepts of 'quality'. Thus, one key public policy implication of the wide picture that this literature survey presents is the imperfection of markets in respect of quality.

Many regard paper based materials as simple and traditional. Yet in the past five decades they have been transformed in structure and content. They have become 'complex objects'. The fact that in some markets, textbooks deliberately designed with the key features of paper based textbooks from the highest-performing systems have not been popular or proved commercially successful suggests the existence of blocks/perverse incentives and/or asymmetry of information about what constitutes quality.

If teachers and resources purchasers are not aware of the quality characteristics of textbooks, then the market drive to quality will not be present. The market is imperfect.

The full picture regarding market imperfection is compounded by the difference in form and function between paper and digital – resulting in quality criteria which are not identical to those relating to paper – and made more complex by the complexity of form and function and by the huge diversity of digital resources.

The challenges of reviewing and approving digital

Those in government departments and agencies, in exam boards and in publishers who are responsible for reviewing digital resources report that it is far more complex and time-intensive to approve digital materials, in comparison with paper textbooks. Not least, it is extremely difficult to navigate all levels, segments and elements of materials, particularly when access to the next segment of learning is dependent on a successful response to the previous segment of learning. This acknowledgement of complexity in reviewing comes from those for whom it is their professional role, or part of it. Mike Trucano's insightful blog (Trucano, 2015) gives reviewers – often hard-pressed teachers or heads of department – a huge list of tasks to perform even in respect of reviewing a single application.

We found only two items of research on the criteria which teachers and other purchasers select digital materials. These consisted of North American survey-based reviews of teachers' views (Deloitte, 2016; Gates Foundation, 2014), although these contained no evidence on or evidence-based advice on the behaviours regarding choice and the manner in which teachers and others could review and compare materials. Being survey-based studies they relate to views present in that cultural setting. A third set of sources comprise marketing advice and blog statements such as the 2015 World Bank Blog (Trucano, 2015) but do not comprise research. A fourth item – the Norwegian 'Quality criteria for digital learning resources (Version 1.0)' can be described as 'loosely research-based', being derived from 'collaboration with interested parties in the education sector, by means of broadly diverse working meetings, conversations with individual parties and focus groups' (Senter for IKT i utdanningen, 2018):

The Senter's 2018 Quality Criteria are organised around seven areas:

- Accessibility
- Metadata labelling
- Parallel language editions
- Technical interoperability
- The digital resource's characteristics
- Academic and educational orientation
- User orientation

The analysis and advice focuses principally on a form of 'relative quality' – the alignment between the teacher's purposes and the purposes of the digital resources. This is consistent with concepts of

'curriculum coherence' – alignment of materials with pedagogic and didactic approach, with aims etc. However, while helping teachers and others understand what to look for, it does not help them understand how to undertake and manage the process of judging individual resources and comparing them – a time-consuming and complex process.

The criteria acknowledge our concern that general quality criteria are applied both to paper and digital materials:

> *…structure, quality of language, use of illustrations, type and scope of assignments etc. are important areas regardless of whether the resources are offered in printed or digital form. The same applies to having a conscious attitude to gender role patterns, discrimination, objectivity and representivity (sic)…* (Senter for IKT i utdanningen, 2018, p. 5).

The criteria include sensible and focussed questions, such as 'does the digital learning resource allow individual parts to be used independently' and 'in what way does the resource challenge the pupils academically?'.

However, as we suggest, as with the Gates and Deloitte research, the Senter for IKT criteria do not engage with the ***process*** of reviewing digital resources: how teachers/purchasers should do it; what time should be devoted to it; what procedures and steps are right; how the process of holding multiple criteria (pedagogic structure, language, demand, etc.) can be managed; and so on. It is important to note that the Scottish Government's review (Scottish Government, 2015) emphasised 'experimentation by teachers' – suggesting that quality and purchasing decisions should operate at the level of the teacher. This is not the only option; it contrasts with state activity on learning materials (Finland, Germany, England, Singapore, Denmark, China) which approves learning materials or strongly signals quality. We analyse this in detail in the section on governance and markets. Whether done by teachers or specialists, interviews we have conducted with those reviewing learning materials suggest that reviewing any form of learning resources presents high cognitive workload (Colligan et al., 2015; Fredriksson & Olsson, 2006; National Aeronautical & Space Administration, 1986), which is increased with materials in a digital format (Bock, 2019).

The additional complexity of form, plus the addition of requirements regarding hardware requirements, interoperability etc. lead to a substantial increase in cognitive and administrative demand. We cannot overstate how complex and time-consuming any systematic process actually is in reality – for hard-pressed teachers, and hard-pressed specialists and officials.

It is a concern that we found no research on different means of and behaviours in comparing materials, their effectiveness, and the extent to which this supported choice and market dynamics. Research on teachers' and agencies' selection processes and behaviours is uncommon, but there are key research texts in relation to paper-based textbooks: such as Reichenberg and Andreassen's 2017 'Similar but not the same: comparing Norwegian and Swedish teachers' influence on textbook selection and involvement in text discussions' (Reichenberg & Andreassen, 2017), Martins et al 'What do physics teachers take into account when choosing their textbooks' (Martins & Dias Garcia, 2015) and Fredriksson and Olsen's 'English Textbook Evaluation – an investigation into criteria for selecting English textbooks' (Fredriksson & Olsson, 2006) – with these last authors observing:

> *…the informants stated that one reason for not conducting a more thorough evaluation was that they found it too time-consuming. Another reason was that materials evaluation was an unknown concept to them…* (op cit p. 3)

Meanwhile, research on evaluation and selection of digital materials is extremely scant. A Rand Corporation report on barriers to using digital materials (Tosh et al., 2020) noted the higher use of digital resources amongst those US teachers who 'had more low-income students' and emphasised in its recommendations the importance of providing information on quality:

> *…Efforts to raise the quality of comprehensive curricula should also extend to digital instructional materials, providing parents and practitioners with information on their quality, alignment with state standards, and appropriateness for different types of students". They did not explore manageable processes of evaluation or comparison but noted: '…Districts and*

> *states have a role to play in setting recommendations and guidelines for the use of digital materials, including the role these materials should play in the classroom alongside comprehensive curriculum materials. Future research needs to address the gaps in the knowledge base, such as* ***digital material quality*** *(our emphasis), alignment with state standards, effectiveness, and appropriateness for different subgroups of students…*
> (op cit p. 10).

This observation highlights confirms our view that serious knowledge asymmetry is present in the digital resource market: purchasers appear poorly-equipped to navigate available materials and to make robust judgements regarding quality. They go on to state:

> *…The sheer volume of digital materials makes this unrealistic to achieve at scale, although evaluation of the most commonly downloaded digital materials already is in place. Creating a more curated set of digital resources that meet certain quality-related criteria could prove a useful resource for teachers….* (op cit p. 10).

This raises vital public policy questions. In a situation of radical oversupply of digital materials and huge diversity in form and function, who should carry the responsibility for discriminating quality and driving purchasing/procurement practices? Research does seem to point to there being ***consequences of poor choice*** (problems of enduring supply, poor learning models, rising inequality etc.). The decisions matter. But lurking in the mix is an increasing drive to teacher and school autonomy (OECD, 2018; Sahlberg, 2014) coming from some influential agencies, which places more emphasis on choices (which we assume includes decisions in respect of learning resources) at the level of the teacher. We contest aspects of the evidence around teacher autonomy (Allen, 2010; Benton, 2014; Cambridge Assessment, 2017; W. H. Schmidt & Prawat, 2006) but recognise that, internationally, it is a common direction of policy development. In respect of the structure of the market in digital materials, this sits uneasily with very high demands associated with the review, comparison and selection of digital materials. In the face of this, the RAND report recommends something rather different: organised curation. But the report does not offer proposals as to who this should be…which agencies, which professionals; using which procedures; funded at what level and by what means.

Curation runs counter to free choice, and comprises restriction – but of course such restriction has been a previous feature of many nations in relation to approval of paper-based textbooks (which we explore elsewhere in this review) but is a relatively uncommon process in relation to digital learning materials – despite the vastly increased difficulty faced by teachers in making decisions of function, utility and quality.

Also critical to choice is the issue of continuing supply – and in the case of digital materials – continuing access. As part of the analysis at the Second International Summit on Textbooks, inclusion of market analysis added:

- How much does it cost - what is the purchase model
- Are there accumulating costs for sustained use and updating
- Will it continue to be available
- What does its use displace or stop (opportunity cost)
- What hardware resource is needed by teachers and pupils and by the school to keep the resource available

All of which add complexity to choice, whether those making that choice are parents, pupils, teachers, schools, municipalities or states.

As part of stimulating ***informed choice***, we found general guidance regarding online materials from the Hong Kong Education Department, to support parents in the choice of paper textbooks. We found online support from a wider range of agencies, state governments, and digital resource producers.

But digital providers themselves stated that market supply was so varied and extensive that rather than teachers making individual choices for their own settings and practices, they relied heavily on recommendations from other teachers, and found that procurement was a complex mix of individual teacher choice and school choice.

In addition to this signalling through professional communities, there also are recommendations included in press stories, blog comment, and advertorial content – all of which lack reference to common criteria regarding quality, utility and function. These are escalating at a pace equal to the increase in supply of the resources themselves – and are notable in the ***divergence*** of their recommendations.

For the final part of this section, we return to the vital issue of locus of control. Recent commentary from a range of nations indicates that, prior to the pandemic, there were increasing concerns about reducing access to electronic publications, many of them previously available in paper form. Over and above the differences in cognitive outcomes and learning behaviours for digital resources (Wolf, 2018), the debate on access and persistent availability is a fundamental one. The 2019 Second International Textbook Summit in Reykjavik (Menntamalastofnun & Cambridge Assessment, 2019) explored issues of the importance of knowledge as an unrestricted public good, and the serious social and political implications of restriction. The Summit explored how the second-hand book market in the US higher education operates as a adverse financial pressure on textbook publishers, and has been responded to by price increases which greatly exceed retail inflation and rental arrangements with minor discounting (Menntamalastofnun & Cambridge Assessment, 2019). In exactly the month following the Summit, a major shift to digital-only e-book provision was announced by a key player in the market (Rosenblatt, 2019). While benefits such as updating are cited (although key textbooks are renewed in editions relatively frequently in the US HE market) the press commentary on the move cited 'increased control over distribution' as a major business asset. Although approved textbooks, combined with pricing arrangements, already operates as a restriction on knowledge as a freely-circulating public good, the move to digital introduces immediately higher levels of additional control – effects which are being reported in research (Casselden & Pears, 2019). Once purchased, a paper textbook is a persistent object which the owner can access in perpetuity. Access to the digital equivalent relies on service provision and permitted access - which can be switched off, and can be done so as a result of contract. Relaxation of cost and permitted access during the COVID-19 pandemic may be seen as a valuable easing of control, but there are no structural impediments to that relaxation swiftly being reversed.

This underlying shift in locus of control is a vital issue for learners, educators and government – and we explore these in more detail in the section on markets and governance. Mass education has pursued and succeeded in vast increase in access to knowledge - thus, all major trends in shifts in this access are of considerable social and political significance.

Reflections

Our review of research highlights the considerable challenge to public policy in education presented by the proliferation of digital learning materials.

> *…a persistent and long running tension in the education technology debate – enthusiasts are interested in the ability to develop digital literacy and to generate personal knowledge, policy makers judge impact through the outcomes on standardized tests. But it seems that neither is finding the outcome they seek…* (McFarlane, 2019, p. 10)

Whilst considerable assets are demonstrated by the range of case studies available across a range of nations, our wider analysis of form, focus, function, markets and control suggests that the far greater sophistication needs to enter arrangements. This should focus on integrating into thinking on policy and practice accumulated research on curriculum aims, pedagogic and didactic models, and market structures. Current arrangements do not offer an unfettered drive to quality, and the imperfect nature of guidance and support on choice of digital materials suggests that far greater discrimination in materials is essential, through greater knowledge on the part of consumers and users, and/or quality processes operating through formal governance. The 2015 report for Scotland (Scottish Government,

2015) emphasised the importance of ‘experimentation’ by teachers operating in ‘networks’ – a commitment to individual action to gain knowledge, then exposed and developed through professional networks – but it is important to note that this represents a promising, but not exclusive, means of enhancing the currently highly problematic interaction of quality and choice.

Our review suggests that science and policy on quality remains seriously underdeveloped, although later research shows increasing awareness of the complex interaction of digital materials with established pedagogic and didactic models, and the impact of social shifts in the use of technology and digital resources.

We suggest that seeking general resolution of a high level ‘paper versus digital’ dispute is too simplistic of an approach to the complexities which are emerging. Research has already moved beyond this. Paper and digital materials are different – the research shows this clearly – and the relative assets of each need to be considered carefully in educational policy and practice. Indeed, the recent resurgence of interest in sophisticated analysis of paper textbooks has resulted in theorisation and categorisation of form, function, role and impact. This has yielded new quality criteria relating to paper textbooks. No such parallel development has occurred with digital materials – their divergence in form and function makes this an essential enterprise - to which, we hope, this review can contribute.

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