Crossing boundaries: Exploring the theory, practice and possibility of a 'Future 3' curriculum

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Aspect examined	Indications of a shift to 'open'	Illustrative Examples
Curriculum (principles governing the selection of and relations between subjects)	Subjects start as clear cut and definable and are selected, and sequenced into a (supra) idea	The subjects Chemistry, Physics and Mathematics are integrated under the guiding question 'What has chemistry got to do with cooking?'
Teacher Role (and how it is regulated)	(Subject) Teachers work collaboratively, while contributing in a specialist subject role, as problem poser/creator	Chemistry teacher responsible for ensuring that the particle nature of matter is covered, learnt, and assessed in the expedition
Pedagogy	Emphasis on the means of knowledge creation and principles established in context of guided-discovery by pupils	Teacher follows pedagogic protocols established in the school and formal structure of expeditions
Pupils / organisation of teaching groups	Pupils relate to each other initially by what is shared in the learning and then by their individual qualities	Pupils formed into 'crews' in which the pastoral concerns are shared. Academic work is collaborative but measures of achievement are individual
The school community	School boundary relationships are open and porous including the internal physical structure of the school, and the visibility of the curriculum	External experts are part of expeditions including parents and all curriculum documents, including outcomes are online (http://xpschool.org/our-expeditions/)

Table 1: Indications of openness

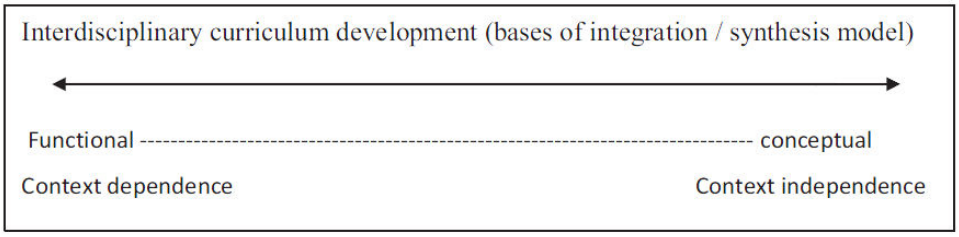

Figure 1: A continuum of integration in interdisciplinary curriculum design

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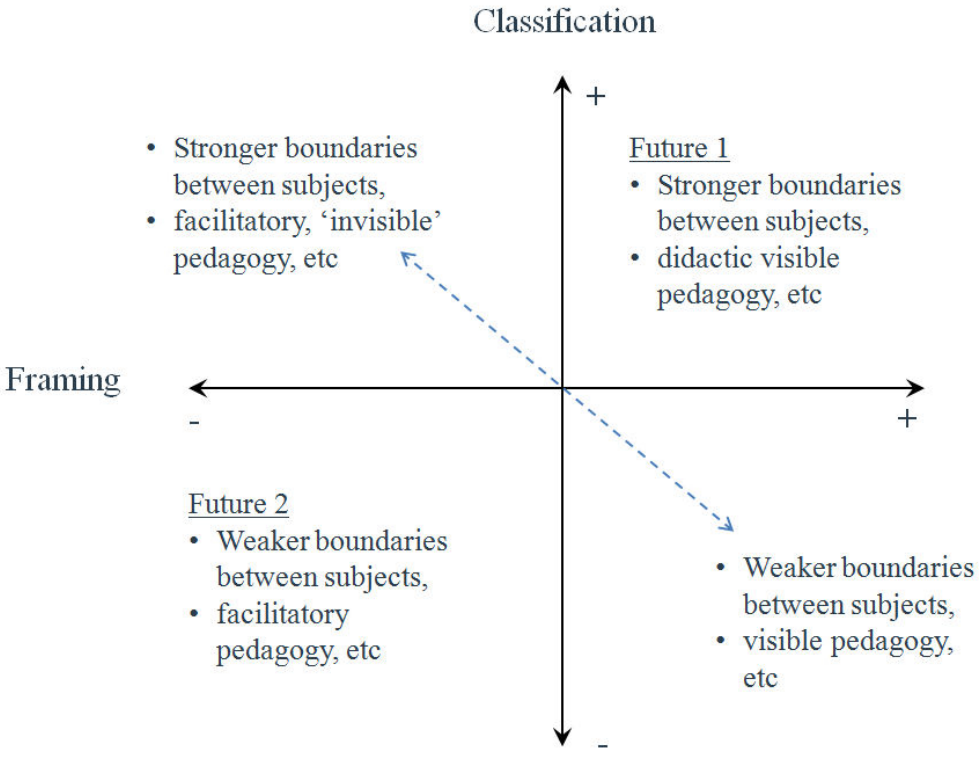

Figure 2: Knowledge coding of future curriculum types (curriculum engagement)

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Abstract

In this paper we examine a case of innovation in curriculum and pedagogy at a new school in the United Kingdom. We begin by outlining Young and Muller's (2010) 3 Futures model which we use as a methodological heuristic in the case study of the school which appears to be both knowledge-led and learner-engaged; characteristics of Young and Muller's Future 3 scenario. In considering the school's curriculum we also draw on a number of concepts from the work of Basil Bernstein: classification, framing, and the idea of open schools, and a curriculum integration model developed by us (author, 2017) to consider the degree of epistemic emphasis in the school's predominantly interdisciplinary curriculum. Together these concepts provide the means to examine the organising principles of practice operating in the school as links are drawn between the Futures model, Bernstein's concepts, and the data. We theorise this as a form of 'opening up', suggesting that even within the context of an interdisciplinary curriculum access to powerful knowledge may be maintained in a whole-school approach where the demands of both knowledge and knowers are brought into a balance. The school's approach and the theorisation we offer may provide insights for other schools embarking on a futures model for education and for 21st Century educational discourses more generally.

Keywords: secondary school curriculum, curriculum integration, powerful knowledge, 3 Futures model, open schools, knowledge-led curriculum.

Introduction

'Is the boundary a prison of the past (whatever the nature of the past) or is it a tension point which condenses the past yet opens the possibility of futures?' (Bernstein and Solomon, 1999; 23)

In 1967 in a brief article in New Society, *Open Schools, Open Society,* Bernstein discusses how schools might continue to develop, precursing the School Futures debate of four decades later. Drawing on Durkheim's conception of mechanical and organic solidarity Bernstein characterises change in education at the time as a shift, respectively, from 'closed' to 'open' schools. He examines the social conditions for a change in emphasis in some of the main features of the school; the forms of social control, the division of labour among the staff, the curriculum (especially how subjects are viewed), the pedagogy, and how teaching groups are organised. It is the principles governing the selection of and relations between subjects in the curriculum, he argues, that in an *open school* shift from subject as clearly defined to subject as a (supra) idea that is increasingly topic-centred and interdisciplinary. For teachers, this refocuses an allegiance from the subject itself to the bearing the subject has upon an organising idea for the curriculum. One very visible outcome of the shift from closed to open is how the boundary between the school and its community is differentiated – formerly sealed off and self-enclosed, the school becomes physically open in form, with porous boundaries between the home, the school, and external experts. As we will show later, in relation to one case study, this becomes a form of 'opening up'.

Bernstein's later theorisation of change in educational (knowledge) practices developed into knowledge codes, classification, and framing (1977), and later into, primarily, two curriculum types - a collection code (stronger classification of curriculum boundaries and stronger framing of pedagogical approach identified as a performance curriculum) and an opposing integration code (weaker classification and weaker framing identified as a competence curriculum) (Hoadley and Jansen, 2009). These curriculum codes have become instantiated as binary types, echoing the traditionalism versus progressivism debate, that over time have silenced the possibility of other formulations. In this paper we re-examine Bernstein's conception of open schools in the light of Futures Thinking about curriculum and the social conditions for an emerging case of innovation in curriculum and pedagogy at one school in the UK.

In building on some of Bernstein's ideas Young and Muller (2010) propose a *3 Futures model* of curriculum types in a paper that has proved to be seminal within the social realist literature (Young and Muller, 2010). Their model is particularly interesting in that it challenges much of the current futures discourse in a number of significant ways. Along with Bernstein's concepts noted above, their model is useful as a heuristic for drawing our attention to the key recontextualising principles in educational discourse. This visibility enables an examination of past and present curricular principles and future possibilities for theorising the secondary school curriculum.

Many of the concepts and related ideas in Young and Muller's 2010 paper have been elaborated and more directly related to practice in the book *Knowledge and the Future School* in which Michael Young is joined by David Lambert and others in translating the ideas for an audience of school leaders and practitioners (Young & Lambert, 2014). In this paper we utilise three key concepts derived from this work to elaborate an imaginary *Future 3* curriculum: - *powerful knowledge*, *the curriculum-pedagogy distinction*, and *teachers as curriculum makers*. In concert with these key ideas and applied more directly to the data, we utilise a *realist conceptual methodology* (Lourie & Rata, 2016; author, 2017; Sayer, 2000; Popper, 1978); a

methodology in which key concepts are brought into dialogue with the data enabling the development of what Bernstein (2000) terms *languages of description* (Maton & Chen, 2016; author, 2017). The 3 Futures model provides an *external language of description,* a generalised and somewhat abstract conceptualisation of a social practice. The classification and framing of curriculum knowledge itself – how knowledge is selected, assembled, and sequenced into a curriculum (Bernstein, 1977) - offers the means to develop an *internal language of description;* a more concrete means of making generative principles visible. This methodological process of creating a 'language of description' - a form of *translation device* or conceptual rubric - provides a means for theory and data to interact (Bernstein, 2000; Author & Author, 2017). Drawing on a model of the integrated curriculum (Author, 2017a) we elaborate this further, as a translation device to examine curriculum making at XP School. This enables us to make visible the move from theory to empirical description and back to theoretical explanation that can then be critiqued by the reader. Alongside this, the notion of 'becoming open' (Bernstein, 1967) offers an organising framework for examining the design and enactment of curriculum, as a recontextualising principle utilised in our research.

In the first section of the paper we give a brief outline Young and Muller's 3 Futures model noting in particular the theorisation of Future 3. Young and Muller's model is particularly interesting in that it challenges much of the current futures discourse in a number of ways which are elaborated in the discussion below. We also introduce related key concepts that are put to work in the paper: *powerful knowledge*; *the curriculum-pedagogy distinction*; and *teachers as curriculum makers*. We also note the issues surrounding curriculum integration or interdisciplinary teaching.

In section two we introduce XP School (www.xpschool.org). Using data from numerous school visits, interviews, observations of curriculum planning and review processes, and curriculum documentation since the school's establishment in 2013, we give an overview of the school's approach to curriculum design and enactment. In section three we discuss the empirical data in relation to the theorisations introduced in the first section to ask in what ways XP might represent an instance of an open school with a Future 3 curriculum: (i) does XP develop a curriculum based on the concept of powerful knowledge; and if so how, (ii) does XP distinguish curriculum from pedagogy and to what effect; and (iii) to what degree and in what sense are XP teachers curriculum makers?

Section 1: The 3 Futures model

Young and Muller's (2010) 3 Futures paper brings a theoretical lens to past, present, and possible future accounts of schooling. It provides a very useful heuristic for enabling discussion of educational principles that shape education as a form of future thinking (p. 11). *Future 1*, a retrospective imaginary, is the world of conservative education where the stronger classification of knowledge is essentially a means to maintain socio-cultural stability. Education comprises "induction into the dominant knowledge traditions that keep them dominant" (2010, p. 17). Knowledge in this account is *knowledge of the powerful*, a form of symbolic control where those in power exert control over how and what knowledge is recontextualised and made available to others. The curriculum in this model is content rather than concept driven and "overly stratified along social class lines" (p. 17). Pedagogy comprises strongly-framed, teacher-dominated, one-way transmission of knowledge through rote learning; a *one size fits all* approach taking little account of the heterogeneity of pupils and the diversity of their learning needs or interests. Most significantly Young and Muller note the major short-coming of Future 1 as an "under-socialised epistemology" where "boundaries are fixed by social imperatives that override the conditions for knowledge and its innate dynamism, fecundity and openness to change" (p. 17).

Where Future 1 is under-socialised *Future 2*, as if in knee-jerk response to Future 1, is over-socialised. The knower rather than knowledge is placed at the centre of the educational space. Knowledge is revealed as "the disguised interests of dominant social groups" (Maton, 2014, p. 6) and therefore the aim is to make education more inclusive, democratic, progressive, and relevant. Future 2 has also aimed to weaken boundaries between the school and the community, and between various types of knowledge. Young and Muller argue that in this Future education has become "over socialised". This discourse "plays down the propositional character of knowledge and reduces questions of epistemology to 'who knows'?" (p. 14). There is a "validation of all cultural forms as equal" and an "uncritical celebration of experiential forms of knowing" (p. 19). This epistemological relativism favours a move towards generic skills and outcomes-based curricula along with non-directive and facilitative pedagogy; "a shift from detailed specification of knowledge to genericism and a focus on skills/competencies, and emphasis on the centrality of the learner, and an articulation of curriculum as assessable outcomes" (Priestly, Laming, & Humes, 2015, p. 1). Many of these ideas, such as constructivist approaches to curriculum and pedagogy, project-based learning, interdisciplinary curricula, and an emphasis on generic skills and dispositions have been carried over into 21st C narratives for learning.

Young and Muller's *Future 3* on the other hand begins with an acknowledgement concerning the foundational relationship between knowledge forms, curricular organisation, and pedagogy. The emphasis in Future 2 on pedagogy at the expense of knowledge has led to what Maton (2014) terms 'knowledge blindness'; a lack of recognition of the importance of different types of knowledge and how epistemic structures can and should effect pedagogy (Author, 2017a; Author & , 2015; Muller, 2006; 2009). In Future 3 some boundaries are to be maintained in order to differentiate the epistemic affordances of different types of knowledge – indeed "boundary maintenance prior to boundary crossing" is a key indicator of Future 3 curriculum thinking (Young and Muller, 2010, p. 16). Along with this re-emphasis on the nature of knowledge itself and in common with Future 2, Young and Muller (2010) call for forms of pedagogy which involve "the active role of the 'recipients' in making the knowledge their own" (p. 15, quote marks in original).

Future 3 rejects the over-emphasis on pedagogy and genericism typical of most 21st C literature and Future 2 current practices, and the over-socialisation of the curriculum itself, apparently to be focussed on the interests of the knower at the expense of what they learn; *learning to learn* is common catch-cry in education (Claxton n.d.), what Biesta (2009; 2012) has termed *learnification*. Moreover, Young (2013) argues there is a deeper moral concern to be addressed; the current orthodoxy is to ask, "is this curriculum meaningful to my students?' rather than "what are the meanings that this curriculum gives my students access to?'" (p. 106). This is the underlying social justice issue of epistemological access (Rata, 2012).

As a result of Young and Mullers' ongoing work (see for example Young and Muller, 2013) we are able to identify and distil three key concepts that will serve as external conceptual referents for the data analysis. These are discussed below. Moreover, we apply our own translation device, developed from the analysis of a range of approaches that schools take towards curriculum making, to distinguish schools along a continuum from functional /pragmatic to principled/conceptual (Author & Author, 2017; see Figure 1).

The challenge of curriculum integration

In an earlier paper (Author & Author, 2017) we noted the challenges for teachers involved in curriculum integration – the key curricular structure employed at XP School in the form of expeditions (see below) – and discussed the concomitant challenges to researchers investigating interdisciplinarity. In that paper we asked the question if curriculum integration is compatible with a knowledge-led approach. We note that Young and Muller appear to throw

doubt on whether the integrated curriculum approach can realise Future 3, aligning it with the weakening of subject boundaries as "the end of boundaries" and the "curricular instrument of choice" indicative of Future 2 (2010, p.18). While we acknowledge the need for a cautionary perspective on interdisciplinary (Chettiparamb, 2007; Barrett, 2007, Moore, 2011) we examine below whether, by means of a measured approach via boundary maintenance, sufficient epistemic strength can be maintained within interdisciplinary contexts to enable boundary crossing so that structured access for students to powerful knowledge is not compromised.

As we argue above, the idea of epistemic structure - how concepts are sequenced and integrated as systems of meaning - has significant implications for access to powerful knowledge no matter what form the curriculum organisation takes (Author & , 2015). What then are the implications for learning where subjects with differing conceptual structures are brought together and where the means for bringing subjects together is external to the disciplinary concepts? The question remains – is this possible, particularly where a high percentage of class time comprises integrated learning. This leads us to another set of related questions: i) how can the approach of interdisciplinary expeditions work without destabilising the intra-epistemic structure of the contributing subjects; (ii) how can a knowledge-led approach sit with a standards-based curriculum; and (iii) how can a curriculum of engagement be effectively realised in this context?

In responding to the challenges facing researchers investigating interdisciplinarity we theorised in our 2017 paper a translation device (see Figure 1) to examine the organising principles of practice operating in interdisciplinary curriculum making – ranging from a functional/pragmatic approach, where design features external to the epistemic structure dominate curriculum making, or towards more to principled/conceptual approaches where the epistemic structure is paramount in driving curriculum design. We utilise the model in relation to XP's curriculum design later in the paper as a means to assess how they mitigate or not the challenges of curriculum integration and access to powerful knowledge. We theorise this as a curriculum design/enactment problem. In the next section we discuss the theoretical concepts, derived from the Futures model, that enable us to examine the basis of curriculum practice in the case study school.

Key theoretical concepts

Powerful Knowledge

Young's (2009) use of the term powerful knowledge was coined to distinguish between two ways of thinking about curricula knowledge as a reflection of political power in society (*knowledge of the powerful*) and knowledge as a means of acquiring the powers of criticality (*powerful knowledge*). In terms of the possibility of Future 3, Young and Muller (2010) argue that it is the social conditions under which powerful knowledge is acquired and produced that determine whether curriculum and pedagogic models might be considered to be Future 3. With regard to these changes in the curriculum these social conditions include the "global specialist communities" that provide the basis both "for the acquisition and production of new knowledge" (p. 19) In this paper we are examining what these social conditions might be. Powerful knowledge will look different in different disciplines and subjects (Firth, 2011; Lambert, 2011; Maude, 2016; Author, 2017b; Ormond, 2014; Yates & Millar, 2016) but essentially it is knowledge that is structured in a certain way – epistemically. Because of this structure - which is based on interrelationships between concepts - students can develop new ways of thinking about the world with which they are already familiar in their everyday lives (Rata, 2016). The essential effects of powerful knowledge, succinctly put, are two-fold: learning to think conceptually and critically ('know-that'). The power is in both the concepts

themselves and their interrelationships in systems of meaning, and in its potential to advance students' powers of thinking, imagination, and 'know-how'.

Cognisance of this inferential epistemic structure, which may or may not be signalled clearly in mandated curricula, should guide the selection, sequence, pacing, and evaluation of the content knowledge (Muller, 2006; 2009). The implication for this study is that we would expect to see cognisance of the epistemic structures of the school subjects clearly visible in curricular design and its impact on pedagogy - a knowledge-led curriculum - particularly where subjects may be packaged as interdisciplinary expeditions as they are at XP school.

The Curriculum-Pedagogy Distinction and a pedagogy of engagement

Where Future 2 attempts to dissolve boundaries between types of knowledge social realism theorises an analytical differentiation between them which provides the means for distinctions to be made in regard to their respective purpose, form, and affordances:

> the curriculum needs to be seen as having a purpose of its own: the intellectual development of students. It should not be treated as a means for motivating students or for solving social problems …. The curriculum should exclude the everyday knowledge of students, whereas that knowledge is a resource for the pedagogic work of teachers. Students do not come to school to learn what they already know (Young & Lambert, 2014, pp. 96-97).

Pedagogy has taken centre-stage in research in the last few decades so much so that knowledge itself (its forms, structures, and affordances) is seldom considered (Biesta, 2009, 2012; Maton, 2014). The theoretical distinction between curriculum content (the what) and pedagogy (the how) provides a powerful means to distinguish where *progressive* ideas of constructivism and student-centred learning are important, i.e. in regard to pedagogy, and where such ideas have serious limitations i.e. in relation to curriculum content (Author, 2016a). As Young and Lambert (2014) suggest above, students' everyday knowledge should not form the basis for the curriculum, but it may be useful as a pedagogic tool for bridging the gap between informal and formal knowledge.

The Future 3 model advocates a curriculum of engagement rather than one of compliance (Young, 2010; Young & Lambert, 2014). By engagement social realists mean not only the establishment of a progressive pedagogic environment but an engagement with the knowledge itself. Young identifies four components in a pedagogy of engagement that all derive from the curriculum: students gain insight into various specialised communities of practice; subjects provide access to "the most reliable knowledge that is available in particular fields" (p. 27); subjects provide the means for students to develop their understanding of the everyday world; and finally subjects provide the possibility for the development of an identity beyond that of the home or of the everyday. The implication for this study is that we would expect to see cognisance of these various types of engagement at XP school, particular those that encourage deep engagement with knowledge.

Teachers as Curriculum Makers

The establishment of a National Curriculum (NC) for England in 1988, as a prescribed set of content to be learnt, represents the influence of a long-standing Future 1 approach. The review of the National Curriculum in 1993 followed complaints that it was too unwieldy and complicated, heralding a shift towards less defined curriculum structure and the possibility of a Future 2 approach. The revised 2014 National Curriculum attempts to swing the pendulum

back towards a knowledge-led Future 1, charging teachers with interpreting and enacting a core of essential knowledge based on school subjects (DfE, 2010, p. 10).[i] These shifts in curriculum policy have given rise to a debate in education that is increasingly polarised into traditional versus progressive ideas about the purpose of the curriculum and how it should be constructed.

However, it is important to make the distinction between a National Curriculum established by government agencies and the curriculum of individual schools, as it is implemented by teachers and experienced by students. However, while acknowledging the low capacity for agency that teachers have in the current UK educational climate for curriculum development (Priestley, Edwards, and Priestley, 2012, p. 192), one thing that the varying emphases in statutory curricula over time have shared is the requirement for teachers to be responsible for designing schemes of work, topic maps, and individual lesson plans for the classroom. This constitutes the form of decision making, involving the selection, sequencing, and pacing of educational content with an emphasis on pedagogic content knowledge (PCK), as a special kind of educational content knowledge that "embodies the aspects of content most germane to its teachability" (Shulman, 1986, p. 9). Ideally, realising the potential of powerful knowledge pedagogically requires the teacher to have a panoramic view of the discipline – its key propositions, theories, and concepts – and then the ability to select and recontextualise this knowledge for the context of the school (Bruner, 1966; Winch, 2017).

There is evidence of a developing case for subject integration within the curriculum as part of the 21st century narratives for education, that would offer teachers increased autonomy and responsibility in curriculum decision-making, including what subjects to integrate and how (Author, 2016b; Author, 2017a). A curriculum that aims to be knowledge-led and student-centred, therefore, places a considerable onus on teachers in which they carry "much curriculum making responsibility" (Young and Lambert, 2014, p. 184). Such a curriculum also requires methodological tools for evaluating the claims made for it (Author & Author, 2017). Indeed, "knowing how and when to separate topics to clarify them and knowing, on the other hand, when to integrate them is a major achievement of skilful teaching." (Parker, 2005, p. 453). In this sense teachers, as curriculum makers, become recontextualising agents.

Section 2: Curriculum making at XP School

In this section we give an overview of the context and emergence of the school and its curriculum in order to examine the organising principles that form the theoretical basis of curriculum making. While this is based on our empirical research the analysis is not a detailed examination of curriculum activity (which we will explore in another paper) but of how curriculum making is characterised. The school in question, XP School, Doncaster, UK, is an 11-19 secondary school established as a *free school*[ii] in 2013. In 2017 it was graded as "outstanding in all aspects" by the Office for Standards in Education (Ofsted)[iii]. The school is chosen in our study because, first, it is a new school, in which the basis of decisions made about curriculum and pedagogy can be isolated more easily and examined. Second, the focus of the school's curriculum and pedagogy, and integrated curriculum, makes visible the extent to which the boundaries of disciplinary knowledge are attended to (maintained) and what happens when subject boundaries are dissolved (crossed). The school is part of a growing academy trust, currently three schools, comprising a second new secondary school, and a local primary school, each following an approach to curriculum and pedagogy developed in the EL (Expeditionary Learning) Schools in the United States (US) (Berger, 2003; Berger et al., 2014).

The signature element of the XP curriculum, drawing from EL Education, is a *learning expedition,* an interdisciplinary project that lasts 8-10 weeks in which subjects are integrated rather than taught separately (Patton, 2012). This paper adopts the term project-based learning (PBL) as the description most closely aligned with the forms of curriculum and pedagogy

typical of XP and EL Schools. The dominant notion, therefore, is of PBL projects as central, not peripheral to the curriculum, and these are focused on questions or problems that *drive* students to encounter (and struggle with) the central concepts and principles of a discipline.

Critics of PBL suggest this experiential approach is too learner-centred and diminishes the role of the teacher while being dependent on resources, including time and detailed preparation (Prince and Felder, 2006). The complexity of projects and the degree of students' cognitive loading required is considerable, with a suspicion that PBL favours students with higher levels of literacy and in possession of a higher degree of cultural capital (Badley, 2009). Furthermore, the transition to PBL from more traditional approaches is not easy, especially given the lack of experience most teachers have with open-ended teaching strategies, the difficulty of transitioning students into more active roles, and with effectively assessing student learning (Ertmer & Simons, 2005).

Teachers making the curriculum together

Central to XP School's approach to curriculum making are its design principles, as stated explicitly in its brochures and the website. There is a clear commitment to personalising the curriculum to meet students' individual needs, including linking learners to real-world issues, and problems. The sense of a common and shared purpose for the school takes the form of a *whole-school approach* to the curriculum[iv], including the development of students' character. The strength of relationships at XP is verified by research (Loe et al., 2017) that shows higher than the norm levels of student-student (8% higher), student-teacher (5% higher), and teacher-student (20% higher) relationships. The report concludes "this is the direct result of the school's culture and its curricular practice" (p. 14).

At the outset, the school made three important curricular decisions: first to follow an integrated curriculum, with expeditions as the signature curriculum element; second that curriculum making by teachers was a shared and collaborative enterprise; and third to follow the national curriculum and standards in planning and mapping the curriculum. Working in expedition teams, teachers are collectively responsible for rigorously designing and testing their plans, a process they find both exciting and liberating (Author and , 2018). We examined the planning documents of 32 expeditions, across the 11-16 age range, that have been taught in cross-subject teams, including the curriculum maps that identify the conceptual structure of expeditions (referred to by teachers as knowledge maps).

Typically, there are four expeditions per year for each year group and eighty-five percent of the curriculum is organised into interdisciplinary expeditions. Curriculum planning involves *atomising* the standards; a process that involves labelling bodies of knowledge, gradually given structure by identifying interdisciplinary links. For example, it was from this exercise that the staff recognised the links between cooking and chemical and physical changes that eventually became a learning expedition (*Chefistry*) with the guiding question 'What has chemistry got to do with cooking?'[v]. Consequently, in addition to a detailed curriculum map, teachers recognised the need for and have developed a knowledge map that shows how the standards are linked and met.

The review of curriculum is ongoing, and expeditions are evaluated after every run. We were able to observe six expedition (peer) review meetings and to examine the curriculum reports and action plans for future iterations. In the review of the expedition 'War! What is it good for?' (combining concepts from history, literature, mathematics, and biology) the teaching team identified an issue in the integration of mathematics and resolved to develop a "mostly number" aligned maths case study. This aimed to enable students to develop fundamental principles of number operations, fractions, decimals, percentage, and the relationships between each. The attention to this improved the integration of data into the future runs of the expedition.

Examination of expedition planning documents, developed collaboratively by each (interdisciplinary) team of teachers, shows close attention to the English National Curriculum standards and long-term learning targets supporting targets and assessment of learning. For example, the long-term learning target 'I can explain how the rock cycle (Science NC standard) relates to the strata of Doncaster' is broken down into four supporting learning targets: '*I can describe the large scale structure of the Earth'; 'I can explain how rocks change over time'; 'I can explain how the strata found in Doncaster came to be there';* and *'I can explain the processes that change organic material into coal'*. While shaped by *big ideas*, of how geological effects over time have shaped pupils' immediate geographical contexts in this instance, they link to enduring conceptual understandings that students return to and which are repeated in other expeditions, for example "make, record, and present observations using data and text using scientific conventions and protocols". In this way teachers making the curriculum at XP attend to the internal coherence of each expedition (how they are constructed) while being vigilant to its external coherence (how expeditions link together to cover, and deepen, the requirements of the curriculum over time).

Assessment includes tests of knowledge, extended writing, answers to the guiding questions, and first-person narratives, and each assessment is made against a rubric of minimum expected grades in which the student is located on a continuum from developing to secure[vi]. The expedition review, made after each run of the expedition for guiding future iterations, considers students' learning and grades as well as the expedition delivery and process. The curriculum making process at XP involves a cycle of three distinct stages: attention to the disciplinary structure of subjects; the integration of specific disciplinary concepts into a form of curriculum (expeditions); and re-attention to disciplinary structure in curriculum review to ensure internal and external consistency.

Access to powerful knowledge?

In considering XP's interdisciplinary curriculum model, and the extent to which powerful knowledge is made possible, we draw on a translation device developed by us (Author & Author, 2017) to examine the organising principles of practice operating in interdisciplinary curriculum making (see Figure 1). We identify two paths to integration differentiated by the degree to which a strong conceptual base existed for each of the subjects involved and whether a conceptual framework for assessment exists (p. 1078). The *bringing together* or integration of the subjects in the *From the ground up* expedition, for example, provoked meanings made by the students during the expedition, that emerged in their answers to the guiding question, expressed as a historical perspective on the values that were once held by members of those mining communities in order that their stories can be passed on. This led to new understandings for students and teachers, such as the interaction of human and physical processes in the environment and novel insights into the ethical consideration of community and the political economy. The distinction here is not only in the academic level that learners achieve (and whether they outpace or exceed national expectations of learning), but rather whether learning is generative of novel insights - or more importantly, perhaps, if it enables learners to go beyond their contexts, as an example of powerful knowledge (Young, 2009), to extend what is presented in a subject context to identify and explore that which might be possible in an interdisciplinary perspective. Notable here is that the generic meta-skills, such as problem solving, are developed in XP's integrated curriculum, but this is an outcome that is a welcome by-product of the curriculum, not its raison d'être; the result of a form of curriculum integration that is principled rather than functional (Author and Author, 2017, p. 1078).

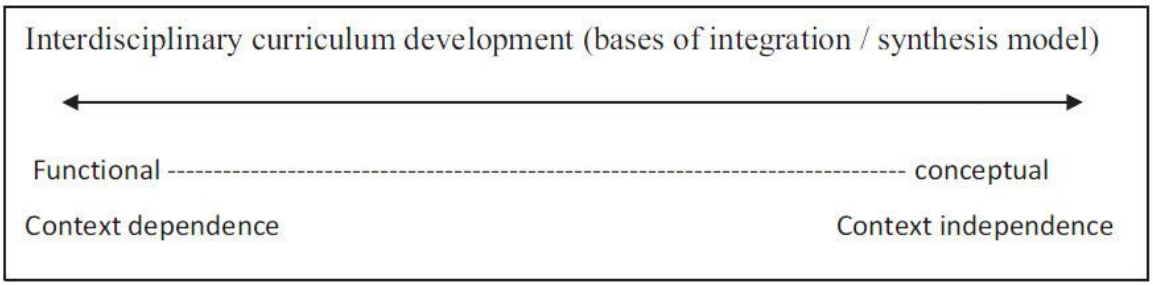

Figure 1: Curriculum integration model (Author and Author, 2017, p. 1078)

Turning to the separation of curriculum and pedagogy, the aim for teachers is to uphold the epistemic principles of disciplinary organisation that give rise to conceptual progression (Rata, 2016), while also giving students a purpose to learn and progress. It is in the mapping of the learning standards and related conceptual mapping (curriculum structure and organisation) combined with the expedition planning and design that make this possible. Teachers have created (epistemic) *progress maps* for each curriculum subject and year group that not only states the *to be learned* but also how knowledge is examined in greater depth and greater complexity from year to year. This stronger level of conceptual integration arises when attention is paid to conceptual progression in the curricular design (Rata, 2016) indicating a principled form of curriculum integration (Author and Author, 2017).

It is important to note, however, that owing to the need to carefully balance the composition of an expedition, there is inevitably a degree of compromise at play in the decisions that teachers make. The integration of some subjects, for example the students' reproduction of the art work of miners' banners, for which the original purpose was political marches and miners' galas, is not easily replicated in classrooms. The inclusion of art in the expedition, therefore, while adding aesthetic appreciation to students' learning, could be viewed as a pragmatic decision. Thus, the work of teachers in making the curriculum at XP can be seen to extend along the continuum of curriculum integration, from principled to functional, in which the context of an expedition can have a lesser or greater determining effect. This variation can be explained, and to some degree predicted, by the translation device for investigating integrated curriculum design developed by the Author & Author (ibid., p. 1078, see Figure 1). It remains for our future research to examine how the consistency of expeditions is maintained throughout the secondary school phase into public examinations, and how the coherence between expeditions over a student's time in the school is developed.

The opening up of XP's curriculum boundaries

Returning to the idea of porous boundaries mentioned in the opening, Bernstein (1967, p. 353) discusses the shift from closed to open schools with regard to whether the (symbolic) categories are (in)visible and the extent to which these are pure or mixed. He describes three significant shifts in the mixing and purity of categories and these offer a benchmark for considering degrees of openness as follows:

1. The mixing of categories at the level of values. Changes to the inside and outside of the school lead to a value system that is more ambiguous and more open to the drivers from outside:

2. The mixing of categories at the level of curriculum. The move away from a curriculum where subjects are autonomous and insulated to a curriculum that involves the subordination of subjects and their integration.
3. The mixing of categories at the level of the teaching group. Heterogenous rather than homogenous teaching groups and differentiated sets of pupils rather than fixed forms or classes.

Applying these categories and Bernstein's conception of open schools as an organising framework for examining curriculum making there are a number of indications of a shift to openness at XP revealed by our research (see Table 1).

Table 1: Indications of openness

Aspect examined	**Indications of a shift to 'open'**	**Illustrative Examples**
Curriculum (principles governing the selection of and relations between subjects)	Subjects start as clear cut and definable and are selected, and sequenced into a (supra) idea	The subjects Chemistry, Physics and Mathematics are integrated under the guiding question 'What has chemistry got to do with cooking?'
Teacher Role (and how it is regulated)	(Subject) Teachers work collaboratively, while contributing in a specialist subject role, as problem poser/creator	Chemistry teacher responsible for ensuring that the particle nature of matter is covered, learnt, and assessed in the expedition
Pedagogy	Emphasis on the means of knowledge creation and principles established in context of guided-discovery by pupils	Teacher follows pedagogic protocols established in the school and formal structure of expeditions
Pupils / organisation of teaching groups	Pupils relate to each other initially by what is shared in the learning and then by their individual qualities	Pupils formed into 'crews' in which the pastoral concerns are shared. Academic work is collaborative, but measures of achievement are individual
The school community	School boundary relationships are open and porous including the internal physical structure of the school, and the visibility of the curriculum	External experts are part of expeditions including parents and all curriculum documents, including outcomes are online (http://xpschool.org/our-expeditions/)

Theorising curriculum thinking and making at XP

While at this point we are able to say XP indicates the characteristics of an open school, in Bernstein's terms, including the weakening of boundaries in an integrated curriculum, the basis of the shift to openness is ill-defined. We now need to examine the social conditions for possible boundary crossing that is implied in a curriculum that is interdisciplinary. To examine

this we begin by identifying the knowledge coding of Young and Muller's (2010) three futures curricula with regard to their classification and framing: classification (C) as degree of boundary maintained between different things in the school, and framing (F) as the strength of the boundary between what may be transmitted and what may not be transmitted in the pedagogic relationships (Bernstein, 1971). Relating this to the three futures the variation in knowledge codes is shown in Figure 2.

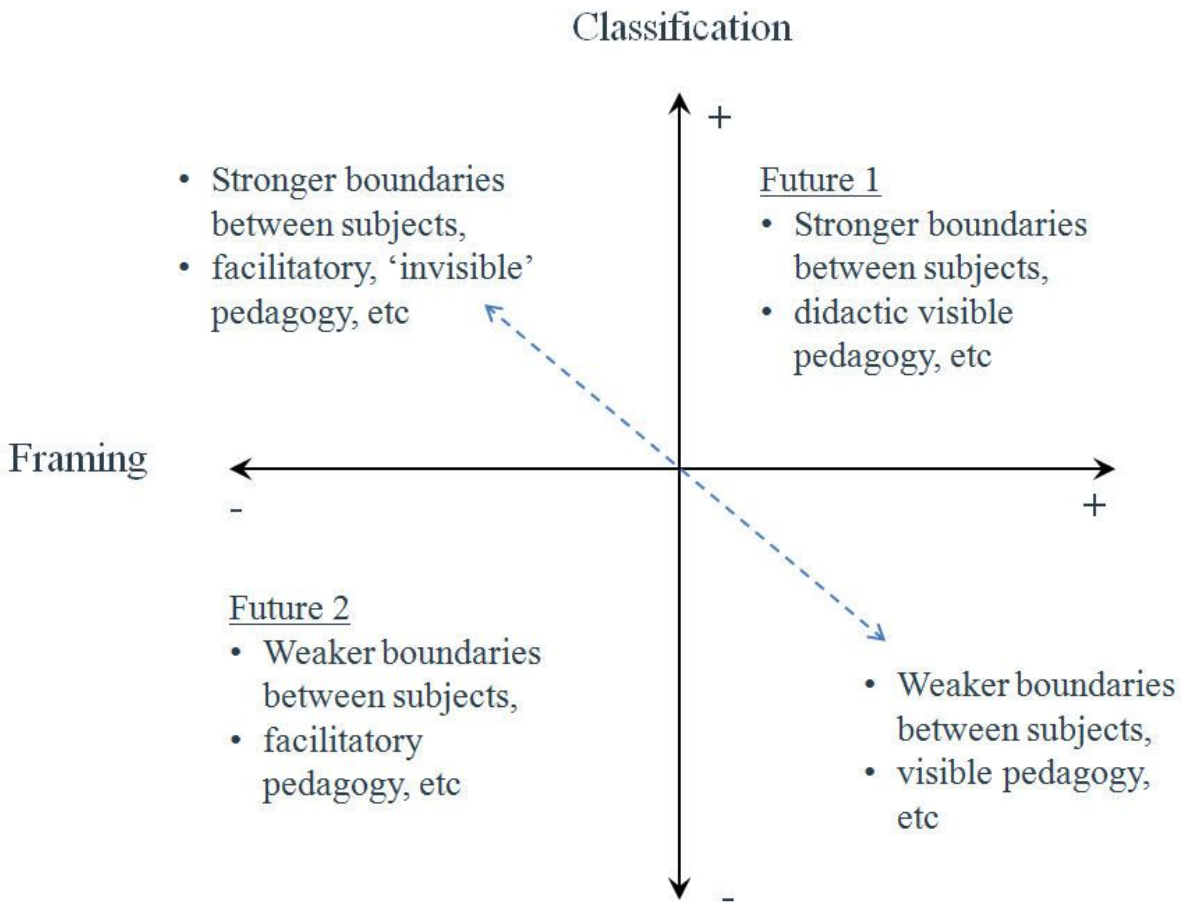

Figure 2: Knowledge coding of future curriculum types (curriculum engagement)

As discussed above, the classification and framing of the curriculum in current thinking is resolved into two types: a collection code (+C, +F) that is broadly analogous to Future 1; and an integrated code (-C,-F) that has a general orientation towards Future 2. In explanatory texts that deal with these codings (e.g. Hoadley and Jansen, 2009) the opposing codes are described as equivalent to positions held by teachers as to their role and purpose: respectively 'I teach history' (collection code) as opposed to 'I teach students' (integrated code). Under-theorised and relatively unexplored are the other quadrants in the coding plane (& Author, under-review). To locate Future 3 in this coding we need to consider the definition of Future 3 as a combination of a knowledge-led curriculum and learner-engaged pedagogy. What differentiates the modality of these codes is what we might consider each to mean, and ultimately how they are interpreted and enacted in schools. As Young and Muller (2010) point out, the current tendency in education is a shift from Future 1 to Future 2 omitting the possibility of other code modalities. Logically, we conjecture, that combining stronger

classification with weaker framing, and vice versa, remains a distinct possibility for curriculum designers and school planners, theoretically at least.

By this analysis the dotted line in Figure 2 indicates a path between the two positions (Future 1/Future 2) in which Future 3 might lie – i.e. the possibility of Future 3. In one sense this path is the *locus of curriculum engagement* that ranges from an engagement based on learners being motivated (as in exciting lessons say) (upper left quadrant, +C,-F) to one shaped by a curriculum engagement (bottom right quadrant, -C,+F) of the type Young (2010, p. 22) refers to as "[distinguished from] the traditional model by their different relationships with learners and, therefore, their different implications for pedagogy and what teachers and pupils do" – in other words one that has the potential for powerful knowledge. An examination of the variations in the strengths of subject boundaries (classification) and the control of the pedagogy (framing), qualifies the role of teachers as curriculum makers and how this is regulated, and the degree to which this is curriculum recontextualisation rather than (merely) reproduction. This *space of possibilities*, therefore, begs a temporal question – as to when, and at what point in the curriculum making process, decisions are made about the form and structure of the curriculum and the pedagogy required to meets its needs.

What differentiates the positions taken by schools in the continuum of curriculum engagement is the attention to subject boundaries prior to teaching. In terms of the XP curriculum this is the attention to boundaries in the selection and sequencing of disciplinary concepts in interdisciplinary contexts. The distinction pivots around whether the curriculum is knowledge-led by teachers in the planning or merely content-led in the delivery of the curriculum. Indeed, as discussed above, it may well involve re-attention to boundaries in the evaluation of the curriculum, as takes place at XP in the review of expeditions, in which a form of boundary maintenance is ongoing.

Locating XP school in this topology and on the locus of engagement is subject to a potential bias by interpreters that Bernstein (1967) makes clear in his discussion of a shift to open schools: the fear that boundary crossing, in its mixing of categories, dissolves the principles of social order based on the sacred notion of the disciplines, rendering them pluralistic. Contrary to this our investigation at XP to date identifies evidence of careful attention to subject boundaries prior to a form of boundary crossing that takes place in principled curriculum integration (i.e. with respect to the conceptual structure of the curriculum – see Figure 1). We locate the form of curriculum engagement at XP to lie in the bottom right (-C,+F) of figure 2, in that, on the surface at least, it implicates a weakening of subject boundaries, but that combined with a well-defined, visible pedagogy, and a teacher role that is achieved rather than given (a role that "*has to be made*" in Bernstein's words (1967, p. 353, original emphasis). In this sense XP's curriculum of and for engagement can be ordered as knowledge-based and teacher-led.

Section 3: Final Discussion

We have examined the basis of curriculum making in the case study school and identified its organising principle as a shift to openness. We have done this using a realist conceptual methodology developing languages of description (Bernstein, 2000) to make the organising principles of curriculum making at XP visible. This methodological process provides a means for theory and data to interact; the 3 Futures model has provided an external language of description, Bernstein's concepts of classification and framing an internal language of description, and our own typology of curriculum integration a translation device for the two languages of description to speak to each other. In this section we return to the key questions

introduced in Section 1 to consider if a Future 3 curriculum remains a form of *future thinking* (Young and Muller, 2010; p. 11) yet to be enacted.

The links to powerful knowledge are clearly visible in the school's expedition planning processes and documents, in the focus of teachers' work, the outcomes of learning, and in the evaluation processes for the curriculum overall. Despite XP's use of key progressive buzzwords, it appears that concepts such as the personalisation of learning and connecting with *real world* problems are firmly grounded in an awareness of them being a means to bring about access to epistemic knowledge: attention is paid to disciplinary boundaries before the design of boundary crossing (and teachers are vigilant in attending to boundaries following integration). This is quite a different emphasis from that common in current 21st century schooling discourse where curriculum discussion is concept-and-content weak but emphasises generic skills and dispositions (e.g. Author, 2017c; Scott, 2015; Badley, 2009). We are suggesting that one social condition for Future 3 is a whole-school approach that is cohesive, collective, and collaborative, and where epistemic concerns permeate the decision making of all dimensions of the school. This bringing together is made possible by the primary pedagogical structure of the expedition that provides the social 'carrier' for the powerful knowledge - the space where knowledge and knower become integrated in a learning whole.

Awareness of the conceptual distinction between curriculum (what might be taught) and pedagogy (the means through which the content is delivered) provides the means for teachers to develop a balanced approach to curriculum development in their work as curriculum makers. The school's regulative *mission* is to imagine students who will have the choice for post-school study should they wish to pursue it. While choosing to follow the NC the teachers at XP have decided to re-think the structure and organisation of the curriculum in line with their design principles. In this form of collective curriculum thinking teachers have responded to the challenges of powerful knowledge and the curriculum and pedagogy distinction, collaboratively (Author & 2018). The curriculum has a dynamic structure and is knowledge-led in that the disciplinary concepts are mapped, and the inferential relations of knowledge are attended to. This degree of autonomy in curriculum decision making is balanced by the need to carefully plan and prepare expeditions that in turn reflect the epistemic requirements embedded in the NC. Importantly, teachers when integrating the curriculum need to know more about the content and PCK of the subject/discipline, not less. This leads us to consider that interdisciplinary expeditions and standard-based assessment are not necessarily incompatible with Future 3. It all depends on the approach and expertise of the curriculum making of the teachers.

The cross-curricular ideas, or themes, present in XP's curriculum require explicit consensus amongst teachers that goes beyond the strong boundaries of the subject-based curriculum towards "a relational idea, which blurs the boundaries between subjects" (Bernstein, 1971, p. 53). The principle of integration, one form of social condition in the case of XP school, therefore, is one that has the potential to create various levels of order for teachers and students across the whole school, in which "the nature of the linkage between the integrating idea and the knowledge to be coordinated must also be coherently spelled out" (Bernstein, 1971, p. 64). The abstract relational idea in XP's case revolves around the guiding question for each expedition and how the pedagogical elements of the expedition are coordinated *in relation to* the epistemic structure of what is to be learnt. `

In his ideas on open schools (open society) and the shifts towards organic solidarity, taken up in the Futures debate, Bernstein is typically prescient and foreshadowing of current trends and debates in education. He advises us not to take boundary crossing as a sign "that yesterday there was order; today there is only flux" or as a "long sigh over the weakening of authority and its social basis". Rather he suggests, we should welcome the opportunity to "explore changes in the forms of social integration in order to re-examine the basis of social

control" as it stands today and what it might be tomorrow. This he says, "as Durkheim pointed out decades ago, is a central concern of a sociology of education" (Bernstein 1967, p. 352). XP's journey as a new school can certainly provide insights and raises questions for other schools embarking on a futures model for education and for 21st C educational discourses more generally.

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[i] Importantly this curriculum is no longer mandatory for academies and free schools, though these are publicly funded. XP School is a free school that has chosen to follow the National Curriculum.

[ii] A free school in England is a type of academy, a non-profit-making, independent, state-funded school which is free to attend but which is not wholly controlled by a local authority.

[iii] Ofsted is the Office for Standards in Education, Children's Services and Skills. It reports directly to UK Parliament and is both independent and supposed to be impartial, though this is questioned by some. By law it must inspect schools with the aim of providing information to parents, to promote improvement, and to hold schools to account.

[iv] By whole-school approach we mean a "cohesive, collective, and collaborative action in and by a school community that has been strategically constructed to improve student learning, behaviour, and wellbeing, and the conditions that support these" (Western Australia DfE, 2009, n.p.).

[v] See http://xpschool.org/our-expeditions/what-does-chemistry-have-to-do-with-cooking/

[vi] See for example http://xptrust.org/assessment-at-xp/