Conceptualizing curriculum differentiation in higher education: a sociology of knowledge point of view

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Abstract
Sociologists of education rooted in social realism have for more than a decade argued that knowledge matters in education, there are different kinds of knowledge, not all forms of knowledge are equal and that these differentiations have significant implications for curriculum. While this argument has made an important contribution to both theoretical and policy debate, the implications for curriculum have not been sufficiently addressed. In other words, a theory of differentiated knowledge has not translated into an adequate theory of differentiated curriculum. Drawing on Basil Bernstein's work on knowledge differentiation and Karl Maton's Legitimation Code Theory, this paper offers an empirically derived emerging framework for conceptualizing differentiated higher education curricula with a particular interest in occupationally and professionally oriented curricula. The framework illuminates the principles underlying curriculum differentiation, thus enabling a richer conversation about epistemological access and progression.

Keywords: curriculum; higher education; knowledge; differentiation; Basil Bernstein; Legitimation Code Theory

Introduction

There is growing urgency in national policy in debates about differentiated pathways for post-secondary education. These debates occur against the backdrop of global concerns about poor completion rates and poor articulation between the secondary and tertiary sectors, underemployed graduates and rising youth unemployment (Cosser 2011; Symonds, Schwartz, and Ferguson 2011; Taylor 2011). Over 70 countries now have or are in the process of developing national qualifications frameworks, which are intended to specify how these different pathways can enable access, progression and articulation (Allais, Raffe, and Young 2009). Despite the significant investment on the part of governments to resolve these issues, stubborn problems

remain. Yates and Young (2010) identify a number of key curriculum policy questions: How should the curriculum respond to the global economic pressures? To what extent (and how) can curriculum policy address issues of inequality and the persistent under-achievement of disadvantaged learners? Do global economic pressures dictate a more integrated curriculum for all learners or one that clearly differentiates between those destined for higher education and those likely to be seeking employment on leaving school? How do educational policies interpret the knowledge base of the curriculum? Is it assumed that it is increasingly anachronistic to base the curriculum on subjects separated by relatively clear boundaries, and if so what alternative curriculum principles are suggested? This paper seeks to contribute to these debates and key questions by offering a conceptual framework for thinking about differentiated curriculum from a sociological knowledge point of view.

The case for knowledge in curriculum

The case for knowledge in the curriculum has been well argued by sociologist of education rooted in social realism (Muller 2000; Young 2008; Moore 2007; Maton 2000; Wheelahan 2010). While the social stance of this position affirms the 'sociality' of knowledge, the realist stance insists that knowledge has a distinct ontological existence and thus cannot be completely reduced to the social. Furthermore, drawing on Basil Bernstein's distinctions, they argue that there are different kinds of knowledge, broadly defined as everyday knowledge and theoretical knowledge. There is an important 'boundary' between these different kinds of knowledge – one cannot be derived from the other. The 'boundary' points to the different ways in which these forms of knowledge are produced and acquired. They have different criteria for validity. While these distinctions reflect some degree of historical and cultural arbitrariness, it is problematic, they argue, for educationalist to deny them. These different knowledges are not equal – theoretical knowledge is socially powerful knowledge. Thus the crucial implication is that if learners are to have access to powerful knowledge, then all curricula, including vocational, must include theoretical knowledge. More specifically, all curricula must include epistemic access to theoretical knowledge. Social access without epistemic access is merely to reproduce social inequality (Wheelahan 2010).

On the basis of these arguments, these scholars have sustained a powerful critique of a range of curriculum policies; for example, outcomes-based education in South Africa (Muller 2000), national qualifications frameworks (Allais, Raffe, and Young 2009), and vocational education (Wheelahan 2010; Young 2006). The gist of the critique is that knowledge has been 'gutted out' of policy discourse. Knowledge has been subordinated to 'outcomes' and thus erased from differentiation discourse (Allais, Raffe, and

Young 2009). As Young has pointed out, this leads to misleading assumptions that these pathways, although different, are equivalent, thus providing a seamless progression 'from sweeper to engineer' (2003, 14).

The implication of these arguments for higher education curriculum is clear: theoretical knowledge is crucial and therefore we should be cautious of any curriculum policy that erodes the disciplines in favour of other logics (Ensor 2004). What is less clear – and yet significant for conceptualizing differentiation – is the relationship between theoretical knowledge and practical knowledge. It is acknowledged that the most interesting challenges lie for those curricula that 'face both ways' (Barnett 2006, 152), which draw on both practical and theoretical knowledge bases. Young (2008) proposes the need for a model for curriculum that acknowledges both the distinctiveness of these knowledges as well as their interrelatedness. It is such a model that this paper addresses.

The comprehensive university: a South African case study for curriculum differentiation

Nowhere have the challenges of curriculum differentiation been more apparent than in the South African case of the comprehensive university. As part of the post-apartheid transformation of higher education, in 2004 the South Africa government created a new institutional type – a comprehensive university. Most of these comprehensive universities resulted from cross-sector mergers of universities of technology with more traditional universities. These mergers resulted in bringing together currricula that historically were on different sides of the binary divide – the so-called 'technical' and 'academic' pathways. Not surprisingly, this has created huge challenges, as Gibbon (2004, 2) notes, 'not only in the way in which the curriculum is organized but in the way in which knowledge is organized'. It has become clear that the success of these mergers to a large extent depends on creating a curriculum framework that clarifies the distinctions between different types of academic offerings. To this end, in 2006 funding was granted by the South African Norway Tertiary Education Development (SANTED) programme to two comprehensive universities – the Nelson Mandela Metropolitan University and the University of Johannesburg – for the development of a conceptual framework for curriculum differentiation between qualification pathways.

The development of this framework has happened in two phases. The first phase (Muller 2009) offers a set of high-level qualification routes differentiated by occupational fields – from particular occupations, general occupations, traditional professions and academia. The curricula within these qualification routes can be mapped along a continuum of different logics. Muller distinguishes between curricula with conceptual coherence – where the logic is that of the discipline – and contextual coherence

– where the logic is that of the professional or occupational requirements. Given their different logics these curricula will draw on different knowledge bases from largely practical knowledge in the particular occupations pathway to largely theoretical knowledge in the academic pathways and various combinations in between. Muller (2009) notes that it is the combinations in between where the biggest curriculum challenges lie for the comprehensive universities and thus require further conceptual refinement.

The second phase embarked on an empirical study in order to better understand these distinctions. The focus of the study was on differentiation of the two main undergraduate qualifications in South Africa – the diploma and the degree. South Africa's National Qualifications Framework recognizes the need for differentiated pathways through higher education. They are broadly defined as the vocational, the professional and the general formative progression routes. The diploma is a three-year qualification in the vocational route. The degree comes in two forms, either a three-year general formative or a four-year professional qualification. Both the diploma and the degree qualifications sit at National Qualifications Framework Level 5 but with different exit levels – the diploma exit-level is Level 6 and the degree exit-level is Level 7. Up to 2004 these qualifications typically resided in different institutions with different identities, missions, students and staff. For comprehensive universities, however, the positioning of these qualifications side by side brought new urgency to long-standing questions about the distinctive purposes of these qualifications and the implications for access, progression and articulation. The study selected 10 curriculum case studies consisting of programmes or areas of study; for example, engineering, computer science, journalism, chemistry, or architecture. In the newly merged institution these areas of study now offer both a diploma and a degree. However, the key challenge for the comprehensive universities is that the logic of curriculum differentiation is not always clear.

The analysis of the case studies revealed – right across the vocational, professional, general formative spectrum – the recontextualization of different kinds of knowledge for different purposes. (The specific details of the study can be found in Shay et al. [2011]). Across all the curriculum pathways, theoretical knowledge is recontextualized – for example, concepts and theories from chemistry, psychology, sociology are selected and sequenced in particular ways. We see the recontextualization of practical, work-based knowledge – for example, how to conduct an interview, manage a budget process, apply the principles of a chemical quality assurer. All of these knowledges are present across all forms of curriculum but they are present in different weightings and in different places. What determines what gets selected, how it is sequenced, paced and evaluated is a broader recontextualizing principle or purpose. This principle is the basis of legitimation; it is the logic, it is what gives the curriculum coherence.

The case for knowledge has made an important contribution to not only theoretical debate but policy critique across various national contexts. However, the implications for curriculum have not been sufficiently addressed; in other words, a theory of differentiated knowledge has not translated into an adequate theory of differentiated curriculum. This paper is a contribution to refining the conceptual framework for curriculum differentiation, by drawing on the SANTED case studies to illustrate what happens when different forms of knowledge are recontextualized for different curriculum purposes.

Conceptualizing differentiated curriculum – a conceptual and analytical framework

The conceptual framework takes as its starting point Bernstein's (2000) pedagogic device, which models the relationship between the field of production (where knowledge is produced), the field of recontextualization (where knowledge is recontextualized into curriculum) and the field of reproduction (where knowledge is transmitted through pedagogy). The pedagogic device alerts us to the transformation of knowledge discourses as they move across the different fields. One can think of the difference between the kind of knowledge produced by physicists and the knowledge of a first-year physics textbook. Knowledge has been decontextualized from its site of production – whether this is a scientific laboratory, a newsroom or a design studio – and recontextualized into a curriculum. It has become pedagogized; it has become educational knowledge.

In further development of his work, Bernstein (2000) sets out to describe the actual forms or structures of the knowledge in the field of production. His interest lies in what distinguishes 'everyday' knowledge, what he calls horizontal discourse, from 'coherent, explicit, systematically principled' knowledge, what he calls vertical discourse (2000, 157). Bernstein's priority in the early drafting of this language of description was to make visible the distinctions between the 'everyday' and the 'systematic', and more importantly within the latter different kinds of knowledge structures – horizontal and hierarchical. Horizontal knowledge structures characterize those intellectual fields where knowledge grows through the accumulation of new languages or theories; for example, English literature or sociology. Hierarchical knowledge structures characterize those fields that grow through the integration of previous knowledge into more general propositions and theories; for example, physics or chemistry. Bernstein referred to these disciplinary fields as 'singulars' in contrast to 'regions' – disciplines that also face externally towards fields of practice; for example, medicine, engineering, or architecture.

Muller (2007) argues that Bernstein's knowledge structures differ in two ways: their verticality and grammaticality. 'Verticality' refers to the internal relations of knowledge and describes how theory develops; for example, its

capacity for integration. 'Grammaticality' refers to the external relations of knowledge or its capacity for precise empirical descriptions. These two criteria for intellectual fields signal that external and internal relations are key features of knowledge practices (Maton forthcoming).

While these concepts are useful starting points, there are limitations with respect to the task of conceptualizing curriculum differentiation. Firstly, various authors (Maton and Muller 2007; Young 2008) have raised questions about the extent to which these knowledge structures are really so distinct. Is there no possibility of verticality in horizontal knowledge structures? Are these 'types' not over-dichotomized? The suggestion is that for analytical purposes it may be useful to think of these criteria or characteristics on a continuum rather than as types. Secondly, what Bernstein offers is a language of description for different kinds of intellectual fields; that is, knowledge in the field of production. It was not his intention to describe what happens when this knowledge gets recontextualized for curriculum purposes. Knowledge progression in the field of production is not the same as knowledge progression in field of recontextualization or reproduction. What is needed is to extend Bernstein's criteria into tools for conceptualizing and analysing the external and internal relations of recontextualized knowledge. For this I draw on Legitimation Code Theory; in particular, the semantic codes of gravity and density (Maton 2011).

Semantic gravity is defined as:

> the degree to which meaning relates to its context, whether that is social or symbolic. Semantic gravity may be relatively stronger (+) or weaker (–) along a continuum of strengths. The stronger the semantic gravity (SG+), the more closely meaning is related to its context; the weaker the gravity (SG–), the less dependent meaning is on its context. (Maton 2011, 65)

Semantic gravity describes the external relations of knowledge practices.

Semantic density is defined as:

> the degree of condensation of meaning within symbols (terms, concepts, phrases, expressions, gestures, clothing, etc). Semantic density may be relatively stronger (+) or weaker (–) along a continuum of strengths. The stronger the semantic density (SD+), the more meaning is condensed within symbols; the weaker the semantic density (SD–), the less meaning is condensed. (Maton 2011, 66)

Semantic density describes the internal relations of knowledge practices.

These two relations conceived as axes form a field of semantic possibilities (see Figure 1).

There is clearly a strong interdependence between these two relations. When meanings are context embedded (SG+), they are likely to be less condensed (SD–). This is horizontal discourse what Bernstein describes as 'oral,

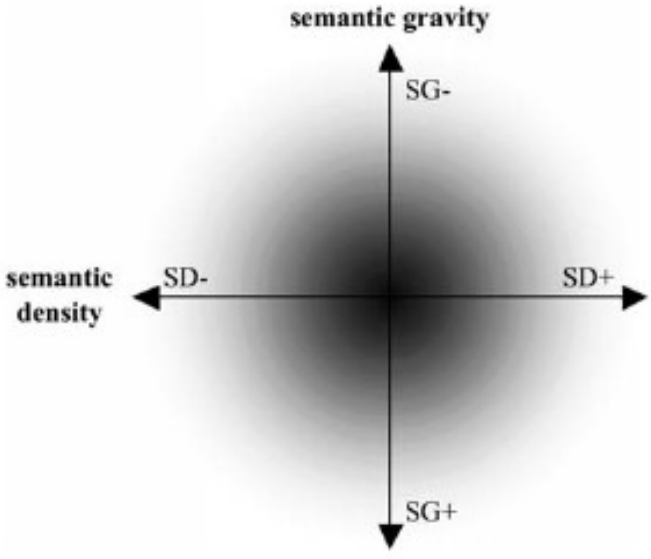

Figure 1. Semantic codes of legitimation.
Source: Maton (2011, 66, Figure 4.1).

local, context dependent and specific' (2000, 157), or what Freidson calls practical knowledge: 'knowledge largely free of formal concepts and theories, learned by experience, and instrumental for performing concrete tasks in concrete settings' (2001, 31). In other words, there is strong semantic gravity (SG+) and weak semantic density (SD–). Thus, by using the semantic codes to map the field of knowledge production (see Figure 2), we can locate practical knowledge in the bottom-left quadrant (Q2) of the knowledge code field.

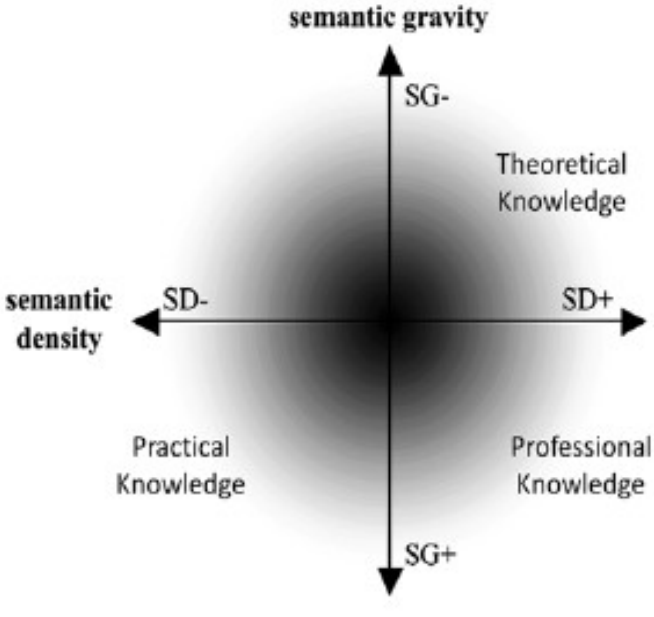

Figure 2. Semantic field of knowledge production.
Source: Adapted from Maton (2011, Figure 4.1).

Conversely there appears to be a strong alignment between meanings that are context independent (SG–) and strong condensation (SD+) – this is Bernstein's () vertical discourse, which he describes as 'specialized symbolic structures of explicit knowledge … linked not by contexts … but procedures are linked to other procedures hierarchically' (2000, 160), or what Freidson calls 'formal knowledge … abstract and general in character … and cannot be applied directly to the problems of work' (2001, 29). In other words, this is weak semantic gravity (SG–) and strong semantic density (SD+) located in the top-right quadrant (Q4) of Figure 2.

But Maton argues that it is possible for density and gravity to vary independently from each other, thus making other code combinations possible (e.g. SG–/SD– and SG+/SD+). These relations can thus be represented as 'continua of strengths [that] provide … a topological semantic space, with infinite capacity for gradation' (Maton 2011, 66), with different quadrants of the plane representing different orders of meaning.

Thus the value of the codes and their advance on Bernstein is that it enables the analytical move from typologies of knowledge to a topology of knowledge practices (Maton forthcoming) since it is possible to map shifts in gravity and density. As Gamble (2004) argues, practical knowledge can also be principled. As her research into craft shows, although the cabinet-maker's knowledge is tacit, it is deeply principled. It relies on an understanding of the relationships between parts and whole, a grasping of the 'essential principles of arrangement' (Gamble 2004, 196). In other words, practical knowledge has the capacity for density. Conversely, she argues that theoretical knowledge can be proceduralized. In other words, there can be a strengthening of semantic gravity – as we see in applied theory. Thus the difference between practical or everyday knowledge and principled practical knowledge of the craftman is a difference in degrees of density. The difference between theoretical knowledge and applied or proceduralized theoretical knowledge is the difference in degrees of gravity. This suggests that the capacity for gravity and density exists in both practical and theoretical forms of knowledge but it is the strength of these dimensions that varies.

There is, however, an important caveat. The boundaries set up by the axes are conceptually significant. Practical knowledge, no matter how principled, does not become theoretical knowledge – and theoretical knowledge, no matter how applied, does not become practical knowledge. The underlying codes of the respective quadrants signal important knowledge distinctions. The reason for this is that while both theoretical and practical knowledge can be principled, there is an important difference: in principled practical knowledge, the principles emerge from the practices themselves; they are the codification of practice. In proceduralized theoretical knowledge, the principles emerge from the theory. This is a fundamental issue – what Young and Muller refer to as the 'irreducible differentiatedness of knowledge' (2010, 15) – to which I return later in the discussion of curriculum and articulation possibilities.

All the above is not new – it simply re-visits Bernstein and Gamble's work on knowledge structures using the language of semantic codes. What is new, however, is that the codes make visible another possibility for knowledge, the bottom-right quadrant (Q3) of Figure 2. This is knowledge that is strong in density and strong in gravity (SD+/SG+). The principles are derived from theory but strongly embedded in practice. This is what Freidson (2001) describes as 'professional knowledge'; that is, 'knowledge and skill of a particular specialization requir(ing) a foundation in abstract concepts … and necessitates the exercise of discretion' (2001, 35).

These distinctions of knowledge codes in the field of knowledge production leave a number of issues unresolved, not least of all the remaining knowledge quadrant (SG–/SD–). Further discussion is outside the scope of this paper. The key point is that if we want to understand curriculum differentiation, and in particular what is distinct about professional and vocational curricula, we need elaborations on Bernstein's knowledge structures. I propose that the semantic codes enable us to do this. I now turn to the analysis of curriculum, which is the central focus of the paper.

The analytical task is to understand the recontextualizing process: what happens when practical knowledge is recontextualized into curriculum? What happens when theoretical knowledge becomes pedagogized into curriculum? What overarching principle or purpose gives the curriculum coherence? By understanding these processes we gain a better understanding of the distinctions between different kinds of educational knowledge and the possibilities of different kinds of curricula. For this task it is necessary to further operationalize Maton's semantic codes. The semantic codes are used to describe the external and internal relations of educational knowledge. At a general level, semantic gravity defines the nature of the context, which constitutes the educational knowledge and semantic density defines the nature of the concept. These two continua suggest that Muller's (2009) contextual–conceptual coherence continua may in fact be collapsing two important dimensions of curriculum into one – in order to get the full range of distinctions, these dimensions need to be analytically separated.

If curriculum is recontextualized knowledge, then semantic gravity enables a more precise description of that context. Stronger semantic gravity (SG+) refers to meanings (ideas, concepts, principles) that are situated in, dependent upon and ordered by practice; for example, a specific task or a problem. On the other end of the continuum, weaker semantic gravity (SG–) refers to meanings (ideas, concepts, principles) that are situated in, dependent upon, and ordered by a system of ideas or theory. As Bernstein notes: 'We have context specificity through "segmentation" in horizontal discourse, but context specificity through recontextualisation in vertical discourse' (1999, 161).

Semantic density enables a more precise description of the concepts. Stronger semantic density (SD+) refers to concepts that are strongly integrated into increasing levels of generality. Weaker semantic density refers to

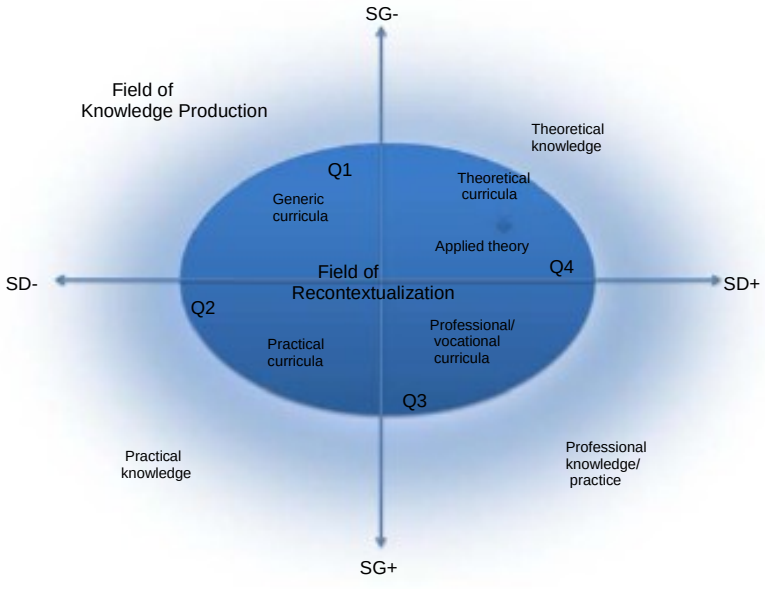

Figure 3. Semantic field of recontextualized knowledge.

concepts that are loosely integrated, more segmented. Various scholars have drawn on Vygotsky's distinction between 'everyday' (or 'spontaneous') and 'scientific' concepts (Shalem and Slonimsky 2010; Young 2008; Bailey-McEwan 2009). Somewhat crudely, spontaneous concepts are descriptions of experience, which 'merely describe what is already present' (Shalem and Slonimsky 2010, 758), whereas scientific concepts 'impose new orders of meaning … they do this by pulling existing concepts into new relations of generality' (2010, 757). It is this capacity of scientific concepts to generalize that enables 'generative' or novel thinking.

Thus, nested within the semantic plane of the field of knowledge production is the semantic field of knowledge recontextualization – a semantic plane for curricula (see Figure 3). The quadrants do not demarcate curriculum types, but rather 'orders of meaning', different logics, and different bases of legitimation. Within each quadrant there are many curriculum possibilities.

Differentiated curricula: illustrations from case-study data

In the analysis of the SANTED case studies we realized that if we were to understand what differentiated, for example, a Diploma in Journalism from a Degree in Journalism we needed to look at the course level. What we discovered is that there were courses in both programmes that were more 'practical' and there were courses that were more 'theoretical'. There were courses that had elements of both, which required students to integrate theory and practice. There were also courses that appeared to have neither theory nor practice; in other words, 'generic' courses. These different types

of courses were more or less present across both types of qualifications – what was different was the selection (what was dominant), the pace (how much) and sequence (the order).

I now turn to a closer examination of these differentiations. I describe each of the quadrants, starting with Q2 and Q4, followed by a description of Q3 and Q1. Each of these quadrants exposes the possibilities and constraints for curricula. I illustrate these descriptions drawing on courses from the case-study analysis; in particular, Journalism & Media and Engineering. In these descriptions, 'curricula' refers to courses.

Q2: practical curricula

Q2 is the recontextualization of practical knowledge. What happens when practical knowledge is recontextualized into curriculum? When such knowledge is extracted from its work context and translated into curriculum, this entails a re-contextualization of context-embedded practices into a set of principles or procedures, even concepts, for these practices. As practical knowledge is de-contextualized from the workplace and re-contextualized into curricula there is a weakening of semantic gravity – context is reduced – and a strengthening of semantic density – there is a condensation of concepts as practices are translated into principles.

To illustrate the possibilities and constraints for curricula in this quadrant, I draw from a course called Advanced Reporting – a third-year course in the Journalism Diploma. Analysis of the course documentation (e.g. course outline, PowerPoint presentation of lectures, assessment tasks) reveals practical knowledge from the workplace recontextualized into a set of principles, processes, and guidelines that students are to apply to some kind of simulated task. For example, in lectures students are introduced to different kinds of interviewing; for example, court reporting, disaster reporting, sports reporting. They are given examples of different kinds of events (e.g. the 2004 tsunami) and they are taken through a series of 'how-tos' for interviewing (e.g. 'be careful not to stereotype'). The assessment is simulated practice (e.g. 'Write a feature article on the Truth and Reconciliation Commission'). The crucial point about curricula in this quadrant is that the principles and concepts are derived from practice not theory. For example, the students are introduced to the concept of 'citizen journalism'. This refers to the phenomenon of 'members of the public playing an active role in the process of collecting, reporting, analyzing and disseminating news and information'. This concept is the 'packaging up' of practice into a phenomenon.

To re-cap, as practical workplace knowledge is codified into principles, its dependency on its immediate context is reduced; semantic gravity is weakened although on the continuum it remains relatively bounded by the context of the practice from which it emerges. This is because its curriculum logic is practice, which puts a 'ceiling' on semantic density. This description

should not be interpreted as de-valuing this kind of curriculum; there is a need and place for it across the qualification spectrum.

Q4: theoretical curricula

Q4 is the recontextualization of theoretical knowledge. Bernstein (2000, 33) describes this process where 'unmediated discourses' are transformed into 'imaginary discourses', stressing that there is always a selection process when theoretical knowledge is translated into educational knowledge. In contrast to Q2 where the curriculum logic is practice, in Q4 the curriculum logic is that of the discipline. The semantic gravity remains relatively weak and the density relatively strong depending on whether these are social or physical science curricula – the latter, according to Bernstein, more strongly integrated than the former.

To illustrate this, I draw on MATH102, which is a Differential Calculus course in the first year of the BEng Mechatronics degree. Learning outcomes for this course include 'Apply the basic rules of differentiation to single variable functions' and 'Apply the methods of differential calculus to solve simple optimization problems'. While there is reference to 'application', this is not application to the world of practice; for example, industry. This is the world of theory. The recontextualization principle is the discipline of mathematics and the alleged purpose is to reproduce disciplinary adepts.

Another example is Political Reporting, a first-year course in the Journalism degree. The course outline states that, 'As a political journalist you will have to understand the basics of political science …', and each week the course outline offers a key concept in political philosophy; for example, realism, totalitarianism, nationalism, liberalism versus communism and feminism. The second half of the course appears more applied as it moves to topics such as global warming, politics of the Third World nations and global terrorism. The assessment focuses on ideologies:

> Choose any two political ideologies and conduct an analysis of each by outlining their basic tenets. Then, do a comparison of each, explaining how they are similar how they are different. Lastly, find an example of where these ideologies currently operate in the international arena …

Despite the reference to practice suggested in the title of the course – Political Reporting – the logic is that of political philosophy, not journalism practice.

Thus curricula in this quadrant can range along the semantic gravity continuum with stronger or weaker reference to practice as one might see, for example, in the difference between a physics course and a physics for mechatronics course. They can also range along the semantic density continuum with strong or weaker integration of concepts as illustrated in the

difference between the weaker density of the Political Reporting concepts and stronger density of the differential calculus concepts. Nonetheless, the curriculum logic is still the logic of the discipline. For this reason these curricula are also 'bounded'. The discipline logic puts a 'ceiling' on semantic gravity; in other words, theory and even applied theory are not directly applicable to solving a problem in practice. For example, the insights about the concept of power gained through a political philosophy course cannot be directly applied to journalism practice. The theory of thermodynamics is not directly applicable to solving an engineering design problem.

Q3: vocational/professional curricula

Q3 is the recontextualization of both theoretical and practical knowledge for vocational and professional curricula. It is distinctive from Q4 because the logic of the curriculum is the demands of the practice. It is distinctive from Q2 because the principles informing the practice are derived from theory. Thus it has relatively strong semantic gravity and strong semantic density. This is what Clarke and Winch (2004, 511) refer to as 'the confident embedding of theoretically informed action in practice'.

To illustrate curricula located in this quadrant I draw on two courses – one from journalism as a 'soft applied' area of study, and one from engineering as 'hard applied'. The case studies show how, depending on the type of theory and the type of problem, there are interesting variations in the way in which theoretical knowledge is recontextualized. The first example is Introduction to Media Studies, a first-year course in the Journalism Diploma. The course aims to provide students with 'the theoretical frameworks from which to view media'. The course draws on a whole range of disciplinary frames of reference (cultural studies, history, sociology and psychology) in order to understand media practice; for example, the role of the media in Africa or the effects of mass communication. Theory is selected not for its own sake but for its relevance to understanding media practice. Theory is marshalled to make sense of practice.

The second example is the final-year Mechatronics Project in the BEng Mechatronics degree. The course outline stipulates that since mechatronics 'concerns the integration of electrical, mechanical, and control/IT disciplines, this project requires the combining of these aspects into a system serving a particular purpose'. The purpose is design. This is reminiscent of Barnett's (2006) description of vocational curricula, which he argues requires a double recontextualization processes – there is the recontextualization of the disciplines into academic subjects and a further recontextualization for vocational purpose – for the 'technological or organizational problems encountered in

specialized work settings' (2006, 147). To understand the challenges of this quadrant I draw on a study conducted by Bailey-McEwan (2009). He argues that this second recontextualization requires the integration of the theoretical knowledge – by integration he means the extraction of common principles from across these basic and engineering sciences. It is these integrated theoretical principles that must be applied to the solving of a particular design problem. He argues that there must be the capacity for the creation of something new; in this case, new design solutions. Thus the capacity for knowledge progression is not in the strengthening of the density alone (as in Q4) but it is the strengthening of both semantic density and semantic gravity. As Clarke and Winch describe it:

> the learner has got to be able to recognise contexts to which the theory applies and those to which it does not. This requires both knowledge of the theory and the ability to recognise the contexts in which it does apply. (2004, 517)

Q1: generic curricula

At the time of the case-study analysis there was no conceptualization for Q1 and thus there are no empirical data to support this description. I propose that Q1 is the recontextualization of a pseudo-practical knowledge. It is 'pseudo' because it is not embedded in a specific practice. In fact, the intention is to generalize a set of key or core skills that are relevant or transferable across a wide range of contexts. It is thus weak in semantic gravity. It is also weak in semantic density because it attempts to be content or concept-less. This is what Bernstein (2000) in his descriptions of performance modes referred to as 'generics' or 'genericism' (Young 2008). We see curriculum manifestations of this quadrant in the strong push over the past few decades towards the specification of learning outcomes, graduate attributes, critical-cross field outcomes (as they are called in South Africa). These include things like critical thinking, problem-solving, global citizenship, becoming a professional, and professional communication. Bernstein suggests that this form of 'trainability' is 'socially empty' (2000, 59). I prefer to reserve judgement. The quadrants are meant to describe not what is good and bad but possibilities and constraints for curriculum. It may be that like Q2, there is a place for Q1 curricula depending on the overall curriculum purpose.

Before moving to the contribution of this conceptual framework for curriculum differentiation, it is important to note its limitations and thus areas for further development. Firstly, there is no claim that gravity and density are the only codes by which to distinguish curriculum. For example, this analysis says nothing about the distinctions between different kinds of 'knowers' that are embedded in curricula. If as Bernstein suggests knowledge specializes consciousness, there is further research to be

conducted on what kinds of student identities are invoked across these quadrants. Secondly, the framework is silent on the regulative discourse; in other words, the underlying values and social norms that constitute and privilege one curriculum over another. It illuminates the epistemic constraints of curricula, but is silent on the social constraints constituted by the staff and students who produce and reproduce these curricula. Thirdly, the conceptualization is silent about pedagogy. It sheds light on the intended curriculum rather than the enacted one. The ways in which theoretical and practical knowledge are recontextualized in actual pedagogy is another rich and important research project. Fourthly, the conceptualization is silent on the level of cognitive complexity. Curriculum type must not be conflated with cognitive complexity; in other words, Q4 does not signify cognitively challenging, nor does Q2 necessarily equate with cognitively simple. This is an important area of development for the differentiation project.

Implications for curriculum differentiation

I now turn in this final section to the implications of this conceptualization for issues raised earlier in this paper; namely, curriculum differentiation and issues of access, articulation and progression.

We are now in a better position to flesh out the different kinds of curricula that constitute Muller's (2009) occupational fields and qualification routes. I focus on the three pathways that are relevant to higher education – what I will refer to as occupationally oriented, professionally oriented and general formative. What the analysis of the case studies reveals is that different undergraduate qualifications within these pathways – the diploma, professional degree and the general formative degree – are constituted by a different mix of curricula from across the quadrants. The general pattern emerging is that the occupationally oriented diploma is constituted by curricula predominantly located in Q2 and Q3. (Predominance refers to what is 'core'. It does not preclude the presence of curricula from other quadrants.) Its purpose is preparation for practice, but the presence of Q3 curricula ensures that it is theoretically informed practice. Critical questions need to be raised of programmes that are predominantly constituted by Q2 curriculum. As various scholars have argued (Wheelahan 2010; Young 2008; Grubb 2006), such curricula will deny students access to powerful knowledge; that is, knowledge that enables new, as yet unimagined, ways of thinking that are essential for innovation.

There are, however, significant curriculum and pedagogical challenges in the recontextualization of theoretical knowledge for vocational purposes, including what to select, how much and in what sequence. For vocationally focused curricula in the hard applied sciences (e.g. Diploma in Mechatronics) the choices are more straightforward – given the 'verticality'

of the knowledge structures, there will be general consensus on the selection of what is relevant and its sequence. For example, there will be little debate about the need for some physics and mathematics and the sequencing of key principles. This is in contrast to vocationally focused curricula in the soft applied sciences (e.g. Diploma in Journalism, Diploma in Management Studies). Should journalism students have history, sociology, psychology and/or political studies? How much of each and in what order? These decisions are much more arbitrary and therefore require robust debate.

Professionally oriented curricula will be constituted by curricula predominantly located in Q3 and Q4. (Once again this does not preclude the presence of curricula from other quadrants; for example, many professional curricula require curricula from Q2.) The purpose is professional practice. What the analysis revealed was a general pattern of progression from Q4 curricula (i.e. the basic and applied sciences) in early undergraduate years to Q3 curricula (i.e. theoretically informed practice) in senior years. There is pressure in professional education (e.g. medicine and engineering) to displace these Q4 foundations for a more problem-based curriculum (for engineering, see Case 2011). This move has been heavily criticized by Bernsteinian scholars, who argue that the logic of the discipline is disrupted at great cost to the development of knowledgeable professionals. The oversight in this critique is that it is assumed that the Q4 curriculum of the traditional professional degree is an adequate foundation for theoretically informed professional practice. Based on his study of an engineering programme, Bailey-McEwan (2009) challenges this. When these basic and applied sciences foundations stand as disciplinary 'silos', he argues, they fail to provide the conceptual tools required for professional practice. Where theoretically informed practice is the goal, what is required are 'integrative links' and 'relations of generality' across the disciplines (Bailey-McEwan 2009, 49). This offers new insight into Q3 curricula: it appears that the strength of the semantic gravity strengthens the semantic density. In other words, the novelty of the problem (e.g. whether clinical, legal, design or economic) requires integration across and hence the abstraction of theoretical principles that supervene the disciplines. If we want to understand the challenges of epistemological access in professional qualifications, this is an area for future empirical work.

General-formative degrees will be constituted by curricula predominantly located in Q4 where the purpose is to produce what Muller refers to as 'disciplinary adepts' (2009, 217). Here progression is increasing theoretical specialization or strengthening of semantic density. There is great pressure on the general-formative degree globally to respond to other agendas than simply those of the disciplines – a sort of 'contextual turn' in higher education curriculum. Bernstein (2000, 55) refers to 'regionalization' as the mode of the late twentieth century. Grubb and Lazerson (2005) call it the 'vocationalization of higher education' and there is evidence of this 'turn' in policy calls for the graduate skills for the twenty-first century.

The contextual 'turn' and the dangers of contextual 'drift' do raise a number of critical questions for the general formative degree as evidenced by one of the case studies. This degree had over time shifted from a predominantly Q4 curricula to one with high proportions of Q3 and Q2. The staff argued that this was a result of increasing pressure from employers and students for a more employment-ready curriculum. This raises a number of concerns for this degree, however: can it serve two 'masters'? How distinct is its purpose from the diploma? Will the dominance of Q3 curricula adequately prepare graduates of this degree for postgraduate studies? The challenge for these general-formative degrees is that, unlike professional degrees, the work-based practices are not as clearly defined as in medicine, law and engineering. The necessary skills and knowledge have to be wide-ranging – the logic of the discipline and these imaginary practices do not align comfortably and there may be a danger of slippage into Q1 curricula – a kind of genericism that Bernstein critiques as 'socially empty'. The challenge for these curricula is a proactive and creative responsiveness to global contextual pulls. Grubb and Lazerson (2005) advocate a pragmatic approach by ensuring that this contextual turn is done in ways that are intellectually, morally sound – maintaining the broad rather than narrow vocational purposes of education. Creative responses may lead to a re-examination of the boundaries between disciplinary domains. Harvard Provost Hyman, commenting on the tension between the autonomy of disciplines and the needs of a rapidly changing world, remarks: 'there's no reason why the problems of the 21st century should happily conform to the academic divisions … concretized … by the end of the 19th century …' (Gazette 2011).

Finally, I briefly address the troublesome issues of access, progression and articulation: if national qualification frameworks have not solved these issues as they promised, where to from here? In fact the solution never was in access to structures, it was always in access to knowledge. Thus with this re-framing of the problem we can begin to interrogate the curriculum alignment between, for example, further education and training and higher education provision. Current proposals in South Africa for strengthening post-school provision (Cosser 2011) still neglect the issue of curriculum articulation from a knowledge point of view. These differentiated codes also shed light on the challenges of articulation across pathways; for example, from the diploma to a degree. In a nutshell, diplomas that are predominantly Q3 curricula will not articulate with degrees where Q4 is dominant. Undergraduate diplomas or degrees that are predominantly Q3 will not articulate with postgraduate studies where Q4 is dominant. Knowledge does indeed matter.

It also sheds light on issues of progression through these qualification pathways. The case studies analysis revealed unacceptably high drop-out rates for many of the programmes, particularly at first-year level. The reasons are varied and complex but from the point of view of curriculum, as noted earlier, each quadrant represents a different 'code' – a different set of criteria

about legitimate forms of academic performance. Increasing numbers of students will require scaffolded support into and across these 'codes'. The appropriate models of 'scaffolding' is the subject for further debate and there is much good practice to draw on. The crucial point is that problems of progression are no longer a minority phenomenon in South Africa (Scott, Yeld, and Hendry 2007) and in many other parts of the world. Addressing these problems will require systemic structural solutions, such as South Africa's proposal to replace its three-year bachelor's degree with a four-year degree.

In conclusion, the contribution of this paper has been to extend the implications of knowledge differentiation to a theorization of curriculum differentiation. In this conceptualization the shadows of 'boundary' remain – there are more and less powerful forms of knowledge and whether our curricula give students access to these will determine whether they are part of society's important conversations (Wheelahan 2010). However this conceptualization enlarges the notion of powerful knowledge. Powerful knowledge is not marked only by its 'verticality'. While the foundations of its power may lie there, its real power may lie in the integration of verticality and 'contextuality'. Thus the 'curriculum of the future' (Young and Muller 2010) will not be the one that protects disciplinarity at all cost. The 'curriculum of the future' will be the one that puts disciplines to work and thereby equips our graduates to understand and resolve the most critical pressing problems of our time.

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