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TOWARDS A PRINCIPLED BASIS FOR
CURRICULUM DIFFERENTIATION

LESSONS FROM A COMPREHENSIVE UNIVERSITY

Suellen Shay, Martin Oosthuizen,
Patsy Paxton & Renée van de Merwe

INTRODUCTION

The Nelson Mandela Metropolitan University (NMMU) is a comprehensive university, formed through the merger of the former University of Port Elizabeth, Port Elizabeth Technikon and one campus of the former Vista University. The six comprehensive universities in the South African higher education sector represent a recent phenomenon emerging through the restructuring process that was initiated in terms of the National Plan on Higher Education (RSA DoE 2001, 2002). Four of the six new comprehensive universities that were founded in 2005 were established through the merger of traditional universities and technikons, while the other two were required to broaden their educational mission through the inclusion of 'technikon-type' programmes in conjunction with their existing suite of 'university-type' programmes. The most distinctive trait of the comprehensives is their ability to offer academic programmes across the full range of qualification types, namely the vocationally and career-focused qualifications that are typical of the universities of technology,¹⁰ and professional and general formative qualifications characteristic of traditional universities. As such, the comprehensive universities have few parallels internationally, with the German *Gesamthochschulen* constituting the closest comparator.¹¹

According to the Ministry of Education, the new comprehensive universities present an important innovation in the higher education landscape. They hold the promise of increased access for a wider diversity of students, improved articulation between

¹⁰ The former technikons were reconstituted as universities of technology in 2003 (Du Pré 2010).

¹¹ It is interesting to note that the *Gesamthochschulen* experiment to create a closer association between research-oriented university education and the vocationally oriented education offered by the colleges met with little success. In fact the higher education system in Germany has moved away from the idea of a unified system in favour of maintaining a distinct binary system (Gibbon 2004; Kyvik 2004).

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career-focused and general academic programmes, and expanded opportunities for research and applied research by linking the research missions of the technikons with the research strengths of universities (RSA DoE 2002). However, significantly absent from the policy discourse to date has been any reflection on the academic rationale behind such expectations, particularly in relation to access and articulation. The rest of this section and the next section present two specific challenges that need to be addressed if the comprehensive universities are to succeed in playing the distinctive role that the policy environment anticipates – whether these institutions have been formed through mergers or the expansion of their educational missions. Both challenges provide a backdrop for the elaboration of a conceptual framework for curriculum differentiation in the rest of the chapter.

The first challenge is related to the assumption that it is possible to bring qualifications across the vocational-professional-general formative spectrum together into an integrated qualifications structure that provides enhanced opportunities for articulation and between qualification levels and types. As Wheelahan (2009) remarks in her discussion of dual sector institutions, the notion of ‘seamlessness’ is often accepted uncritically, leading to a denial of the epistemological challenges facing the development of a coherent curriculum framework across different qualification types. She remarks that “epistemological boundaries must be explicitly navigated, rather than ignored, if students are to be supported in crossing them” (Wheelahan 2009:36). It follows that for NMMU the success of the merger depends largely on the possibility of creating a curriculum framework that clarifies the distinctions between different types of academic programmes in terms of their knowledge properties within the context of the specific academic fields and disciplines that it accommodates.

To this end in 2006 NMMU, together with the University of Johannesburg – another comprehensive university created through a cross-sector merger – was granted funding through the South Africa-Norway Tertiary Education Development (SANTED) programme for the development of a consolidated programme and qualifications framework at both universities. At NMMU the crux of the project was the development of a conceptual framework for curriculum differentiation between qualification pathways. The work in this part of the project proceeded in two phases. In the first phase, ten case studies were selected from disciplines and fields in which university- and technikon-type qualifications were now offered in parallel by a consolidated academic school or department. Each case study focused on a national diploma and a degree programme within a specific area of study. Preliminary proposals for a consolidated qualifications structure in all the case study areas were developed on the basis of an analysis of aspects such as the purpose, outcomes and learning components of existing programmes as well as the proposed educational purpose of particular programmes, and the access and articulation opportunities offered by them, within an integrated qualifications framework. In the second phase, four case studies were selected for a deeper analysis with the purpose of developing a curriculum typology that would clarify the curricular characteristics of different types of qualifications within specific fields and disciplines.

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Both phases of the project were based on Muller's work on curriculum planning for comprehensive universities, which sets the fundamental pillars for conceptualising differentiation between qualification pathways (Muller 2008, 2009). This chapter further elaborates on how the SANTED project at NMMU has built on Muller in the development of a curriculum framework. Its key contribution is firstly to conceptualise the recontextualisation of knowledge types into curriculum types and secondly to develop an analytical tool for the analysis of differentiation and progression of curriculum. From section 3 onwards, this chapter reports on the conceptual and methodological framework, the findings of the case study analysis and the implications of these findings at both institutional and national level. Before proceeding to these issues, attention is given to the second challenge facing comprehensive universities in the development of an appropriate qualifications framework, namely the tension between hierarchical prestige and functional specialisation.

DIFFERENTIATION: KEY DEBATES

The broader debate on differentiation in higher education provides an important perspective on prospects for the promotion of access and articulation within the comprehensive universities. Bleiklie (2003) argues that within unitary higher education systems the manner in which institutions define their academic identities is influenced by the value that they, and the policy and regulatory environment in which they operate, attach to hierarchical prestige over functional specialisation. A hierarchical model implies standardisation, and therefore prestige based on a common set of criteria that typically are shaped by the norms of traditional research universities. A model of functional specialisation provides space for different institutions and institutional types to make differential contributions to higher education provision, thereby creating a framework within which institutions that offer vocationally oriented qualifications may play as valuable a role as research-led institutions. The tension between an orientation towards hierarchical prestige and functional specialisation plays itself out within individual institutions as well as higher education systems. One can see these tensions and struggles over academic identity at the curriculum level in, for example, what is referred to as the phenomenon of academic and vocational drift (Codling & Meek 2006), with drifts towards greater vocationalism in traditional universities and drifts towards more theoretically oriented work in universities of technology.

The implication for higher education institutions in general, and the comprehensive universities in particular, is that ideological and cultural assumptions about academic, and therefore hierarchical, prestige will invariably influence the manner in which members of academic staff view the value of different qualification types such as degrees, and especially diplomas. The overall institutional educational philosophy, the culture of specific academic units and the signals that are sent out by the policy environment will shape the extent to which academic staff members are able to appreciate the intrinsic value of qualification types that fulfil distinctly different, yet equally valuable, functions. With respect to the policy environment, South African higher

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education discourse exhibits a tension similar to that of many other national systems. On the one hand, the funding framework privileges hierarchical status through the application of an undifferentiated approach that rewards research activities associated with traditional universities. On the other, statements such as the Declaration at the 2010 Higher Education Summit affirm the urgent need to develop a differentiated higher education system that provides for a continuum of institutions with diverse strengths and purposes.

With respect to NMMU, its policy discourse signals an endorsement of functional specialisation. The University's mission emphasises its commitment to offering "a diverse range of quality educational opportunities that will make a critical and constructive contribution to regional, national and global sustainability" (NMMU 2010:18). The reality for NMMU is that it attracts 70% of its student population from its own province, the Eastern Cape, the most economically and educationally impoverished of South Africa's provinces. For the majority of the students who qualify for university, the diploma is their only access route. As a result, one of the underlying premises of NMMU's developing academic plan is that a strong suite of diploma programmes, with differential approaches to admission and placement, will make a major contribution to providing access opportunities, as well as addressing education and training needs at a local and regional level. Arguably, NMMU's choice for functional specialisation is facilitated by the fact that a large percentage of its undergraduate programmes have a professional or vocational nature. Institutions which have a more balanced mix of qualification types may find it more difficult to navigate the tension between hierarchical status and functional specialisation. The key issue is that strategic decisions about the recurriculation of qualifications and the consolidation of qualification structures will be influenced by the relative power of hierarchical and functional views. The navigation of epistemological boundaries within a conceptual framework for curriculum planning takes place within the context of contestations around the value of different types of qualifications.

In order to explore the conditions related to the development and preservation of strong diploma programmes, the SANTED project focused on the relationship between undergraduate diplomas and degrees that, as a result of the merger, are now offered within the same academic department or school. In terms of the regulatory system that preceded the new Higher Education Qualifications Framework (HEQF), and that is still reflected in the design of most undergraduate diplomas and degrees, both qualifications sit at the same exit level on the National Qualifications Framework (NQF), but have different admissions requirements.

We now turn to the development of a framework for conceptualising knowledge and curriculum differentiation in these respective qualifications.

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK: CONCEPTUALISING KNOWLEDGE AND CURRICULUM DISTINCTIONS

The starting point for the conceptual framework is Muller's (2008) classification of occupational fields, knowledge and induction. Muller argues that within each occupational group there is differentiation in the knowledge base, ranging from practical knowledge in the occupational pathway to theoretical knowledge in the academic pathway and various combinations in between. It is, he argues, the combinations in between that offer the biggest challenge for the comprehensives and requires more fine-grained distinctions. For these finer-grained distinctions we now turn to Gamble (2009).

Building on and extending Bernstein's (2000) theorisation of knowledge, Gamble (2009) also distinguishes between theoretical and practical knowledge (what she calls 'general' and 'particular' knowledge). She argues that these forms of knowledge can be further divided into principled and procedural. In other words theoretical knowledge can be principled (pure theory) or proceduralised (applied theory). This distinction between pure and applied theory is familiar to us. Gamble argues however that the same principled/procedural division can also be found in practical knowledge. There is the proceduralised practical knowledge of the everyday, but her research into craft provided evidence that practical knowledge can also be principled. While 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). This research gives us insight into knowledge building that emerges from the field of practice – often tacit, but as Gamble argues, highly principled, enacted and embodied. The key point is the recognition that while the distinction between practical and theoretical knowledge is crucial, within these 'types' there are similarities – practical knowledge can be more or less principled and theoretical knowledge can be more or less proceduralised.

Drawing on Gamble's conceptual distinctions, we devise a knowledge typology which distinguishes between *conceptual* knowledge and *procedural* knowledge (see Figure 4.1). (These terms are synonymous with Gamble's general and particular or the more commonly used distinction of theoretical and practical, but we believe they carry less 'baggage' for application in higher education curriculum.) For each of these types further distinctions are made between principled and procedural, thus creating a four-part knowledge typology: conceptual knowledge, proceduralised conceptual knowledge, procedural knowledge and principled procedural knowledge. Thus both conceptual and procedural knowledge can be principled but with an important difference: in principled procedural knowledge the principles emerge from the procedures themselves; they emerge from the codification of practice. In proceduralised conceptual knowledge, the principles emerge from the conceptual domain; from the theory. These are distinctive forms of knowledge and do not necessarily lead from

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one to the other. Procedural knowledge does not lead to conceptual knowledge and conceptual knowledge does not lead to procedural knowledge. This is a fundamental issue to which we return later in the discussion of curriculum and articulation possibilities.

FIGURE 4.1 Knowledge typologies (adapted from Gamble 2009)

Given this knowledge typology the conceptual framework accounts for what happens when these different kinds of knowledge are drawn on as resources for curriculum, or 'recontextualised' into curriculum (Bernstein 2000). Muller (2008) distinguishes between different curriculum logics, that is, curricula that have conceptual coherence and those that have contextual coherence. Conceptual coherence refers to curricula with an internal logic; the logic of the curriculum comes from the logic of the discipline (though the logic of the discipline and the logic of the curriculum are never exactly the same). Contextual coherence refers to curricula with an external logic; the logic comes from the external purposes of the curriculum, such as professional and occupational requirements. These logics are better thought of as a continuum since both are always present – curricula that cohere around a contextual logic are not devoid of conceptual knowledge, and curricula that cohere conceptually are not devoid of contextual concerns. The issue is: which is the dominant logic? Depending on whether it is predominantly conceptual or contextually oriented, different types of knowledges will be recontextualised in different ways.

This is the conceptual framework that we took to the analysis of four case studies – Architecture, Chemistry, Building Environment and Journalism and Media Studies – that constituted the second phase of the project. On the assumption that issues of differentiation and progression of curriculum will vary according to the knowledge structure of the discipline, we intentionally selected, as far as possible, case studies from different disciplinary groupings (Becher & Trowler 2001): Chemistry (hard/pure), Architecture and Building Environment (hard/applied), and Journalism and Media Studies (soft/applied & soft/pure).

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In each case study documentation was collected for each module that made up the diploma and the degree: module outlines, assessment tasks and rubrics, lecture PowerPoint slides and any other documentation that staff were willing to supply. The one exception was the Chemistry case study: in this case Chemistry is a stream of the BSc along with two other streams (Microbiology and Biochemistry). Only the Chemistry stream documentation was collected and analysed.

For each module the following questions were posed:

- What is the dominant logic of the module curriculum? Is it predominantly a conceptual or a contextual logic?
- What type of knowledge dominates in the module? Is it proceduralised knowledge or principled proceduralised knowledge? Is it conceptual knowledge or proceduralised conceptual knowledge?

A preliminary analysis of the Journalism and Media Studies case study revealed in both the diploma and the degree modules which had a conceptual logic as well as which had contextual logic. In response to the second analytical question, the preliminary analysis revealed a number of possible combinations (see Figure 4.2). With respect to the contextually oriented modules, there were three possibilities: those with procedural knowledge (C1), principled procedural knowledge (C2) and procedural conceptual knowledge (C3). With respect to conceptual orientation, there were two possibilities: those with predominantly proceduralised conceptual knowledge (applied theory) (C4) and those with predominantly conceptual knowledge (pure theory) (C5).

FIGURE 4.2 Curriculum typologies

We are not claiming that these C1-C5 categories are exhaustive of the curriculum possibilities: with further analysis new types or variations of existing types may emerge. What is particularly significant is the distinction between C2 and C3 curriculum types – contextually oriented modules with procedural knowledge in contrast to those with

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conceptual knowledge. In other words, the framework recognises the possibility of vocationally oriented curriculum with a conceptual knowledge base.

From the preliminary analysis the need also arose to specify different levels of cognitive complexity. We did this by using a taxonomy devised by Umalusi¹² (adapted from Krathwohl 2002, cited in Gamble 2009) (see Table 4.1). The analysis of cognitive complexity enabled us to distinguish between, for example, a conceptually oriented module that simply required recall (low cognitive demand), explanation (medium cognitive demand) or application (high cognitive demand). The key issue here is that cognitive complexity is not coterminous with curriculum type. It is possible to have C3 curricula at a high level of cognitive demand.

Using these analytical tools, each module for each of the case study curricula (diploma and degree) was coded for curriculum type (C1-C5) and for cognitive complexity (Low, Medium or High). While the researchers did an initial coding, decisions were confirmed after discussions with the academic staff who teach on these programmes. Once the coding was complete, modules were aggregated across each year (Year 1, 2 and 3) by curriculum type and cognitive complexity and weighted by credits, e.g. all the credits for the modules coded C2 within a particular year were added and divided by the total credits for the year (120) to arrive at percentage of curriculum type per year, e.g. 16% of credits in Year 1 of the National Diploma (Building) are C2 type. Cognitive complexity was recorded according to whatever level (L, M & H) was most dominant. For example, C2 H means that the proportion of C2 type credits are at a high level of cognitive demand. If there was relatively even allocation, both levels were recorded, e.g. C2 M & H. While this methodology is labour intensive in that it requires analysis of each module, we feel that this is necessary to capture the aggregate knowledge profile of the programme.

FINDINGS: SUMMARY OF THE CASE STUDY FINDINGS

The findings for the four case studies are subsequently presented: Building Environment, Journalism and Media Studies, Chemistry and Architecture. The analysis of each programme results in a graphic representation of the selection and progression of curriculum types. 'Progression' refers to the extent to which there is development of complexity with respect to a particular curriculum type across Year 1 to 3 of the programme. For example, C2 Low in Year 1 to C2 H in Year 3 would be evidence of progression. The findings for each case study are presented in three parts: selection of curriculum types, sequence of the curriculum, and the implications of selection and sequence for progression and articulation.

¹² Umalusi is the quality assurance body in South Africa for general and further education and training bands of education.

CHAPTER 4 • TOWARDS A PRINCIPLED BASIS FOR CURRICULUM DIFFERENTIATION**TABLE 4.1** Levels of cognitive demand/complexity (adapted from Gamble 2009)

Category	Level	Description	Examples (from Building Environment)
LOW Factual recall Rote	1: Simple	<ul style="list-style-type: none"> Simple factual recall 	Define a Bill of Quantities
	2: Medium	<ul style="list-style-type: none"> Complex content recall 	Discuss the factors to consider when obtaining prices for materials
MEDIUM Understanding of concept/principle Application Analysis	1: Simple	<ul style="list-style-type: none"> Simple relationships Simple explanations 	Explain what is meant by ...
	2: Medium	<ul style="list-style-type: none"> More complex relationships or explanations Counter-intuitive relationships Qualitative proportional reasoning 	Differentiate between estimating and costing
	3: Challenging	<ul style="list-style-type: none"> Identification of principles that apply in a novel context 	Write a typical specification clause on: a) an excavation for surface trenches b) mixing & placing of concrete
HIGH Problem solving Creativity Critical & analytical skills Application & integration of all skills	1: Simple	<ul style="list-style-type: none"> Simple procedure Plugging into formula with only one unknown No extraneous information Known or practised content 	Generate quantities for the element 'Finishes' according to given schedule of finishes
	2: Medium	<ul style="list-style-type: none"> More complex procedure Construction or interpretation of diagrams Problems with 2 or more steps Basic logic leaps Proportional reasoning Interpretation of data tables Higher level of writing skills/creativity 	Calculate the individual cost items in a boundary wall (specs given) and add overhead profit once only to total cost
	3: Challenging	<ul style="list-style-type: none"> Integration of all skills Publishable product Complex abstract representation Combination of concepts across sub-fields Complex problems involving insight and logic leaps Formulating new equations (using all unknowns) Problem solving in a novel context 	Calculate the estimated building costs of a dwelling based on drawings, specs and given info by using the Rough Quantities Method

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In the National Diploma (Building):

- The overall curriculum logic is contextual with a very high proportion of proceduralised conceptual knowledge (C3) (83% in Year 1, 100% in Year 2 and 3).
- A very low proportion of principled procedural knowledge (C2) (16% in Year 1).

In the BSc (Construction Economics):

- The overall curriculum logic is contextual with a very high proportion of C2 and C3 across all three years of the programme. (C2: 59% in Year 1, 38% in Year 2 and 43% in Year 3) (C3: 28.5% in Year 1, 62% in Year 2, 46% in Year 3). There is a surprisingly high proportion of principled proceduralised knowledge (C2) in comparison with the National Diploma (Building).
- There is a very low proportion of C4 (12% in Year 1 and 9% in Year 3).

Sequencing of curriculum type

In the National Diploma (Building):

- There is a high level of cognitive complexity with respect to C3 at all levels of the diploma (high and medium in Year 1 and high in both Year 2 and 3).

In the BSc (Construction Economics):

- With respect to C2, there does not appear to be an increase in cognitive complexity to Year 3.
- With respect to C3, there is some increase in cognitive complexity from Year 1 to 3.
- With respect to C4, there is no increase in cognitive complexity from Year 1 to 3.

Implications for progression and articulation

A number of implications for progression and articulation can be drawn from the analysis of the Building Environment case study:

The diploma has a clear core of C3 at a high level of cognitive complexity. With respect to the degree, the main progression appears also to be in C3. Surprisingly, however, the cognitive complexity of the C3 in the degree appears to not be as high as the diploma. One would also have expected a higher proportion of C4 in the degree. Questions also need to be raised about the high proportion of C2 in this degree. Given the small proportion of C4 in the degree, progression into an honours degree may be problematic. In terms of articulation from the diploma to the degree, the diploma student may be well-prepared with respect to C3 but the C4 requirements of the degree in Year 1 may pose a stumbling block.

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FIGURE 4.3 National Diploma (Building) / BSc (Construction Economics): selection and sequencing of curriculum type

JOURNALISM & MEDIA STUDIES: NATIONAL DIPLOMA (JOURNALISM) AND THE BA (MEDIA, CULTURE & COMMUNICATION)

Selection of curriculum type (see Figure 4.4)

In the National Diploma (Journalism):

- The overall curriculum logic is contextual with a very high and increasing proportion of principled procedural knowledge (C2) within each year (69% in Year 1, 79% in Year 2, 100% in Year 3).
- There is a relatively small proportion of conceptual knowledge (C3 & C4) (C3: 12% in Year 1, 14% in Year 2, 0% in Year 3) (C4: 6% in Year 1, 7% in Year 2, 0% in Year 3).

In the BA (Media, Communication & Culture):

- The overall logic of the degree also appears to be contextual with a high proportion of contextually oriented curriculum types (C2 & C3) (C2: 32% in Year 1, 38% in Year 2, 47% in Year 3) (C3: 49% in Year 1, 38% in Year 2, 33% in Year 3).

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- Although it is contextually oriented, in contrast to the diploma, there is a high proportion of conceptual knowledge (C3 & C4) (C3: see above) (C4: 18% in Year 1, 24% in Year 2, 20% in Year 3).
- There is a surprisingly high proportion of principled procedural knowledge for a degree (C2) (32% in Year 1; 38% in Year 2; 47% in Year 3).

Sequencing of curriculum type

In the National Diploma (Journalism):

- There is an increase in complexity from low to high levels of C2 between Year 1 to Year 3.
- There is no increase in complexity in the conceptual knowledge (C3 & C4) between Year 1 and Year 2.

In the BA (Media, Communication & Culture):

- There is evidence of increasing complexity with respect to C2, C3 and C4.
- In contrast to the diploma, the degree shows increasing complexity of conceptual knowledge (both C3 & C4).

Implications for progression and articulation

The following implications for progression and articulation can be drawn from the analysis of the Journalism and Media Studies case study:

The diploma appears to have C2 as its core curriculum type. The relatively small proportion of conceptual knowledge and the lack of progression of conceptual knowledge in the diploma raise a number of concerns. The lack of C3/C4 in the diploma would suggest that progression from the diploma to postgraduate studies as well as articulation from the diploma to the degree may be difficult. (Journalism staff confirmed that currently those students who articulate with 180 credits in the diploma across to the degree struggle academically.) If systemic articulation pathways are to be established, this analysis suggests the necessity of establishing a stronger conceptual taproot in the diploma. More fundamentally, questions need to be raised about whether a programme which is predominantly C2 belongs in higher education.

The degree does have a strong core of conceptual knowledge. However, questions also need to be raised about the high proportion of procedural knowledge (C2/C3) in the degree. It is possible that this is a result of what staff identified as a “contextual drift” as the degree has felt pressure in the recent past to be more ‘relevant’, to produce graduates who are more “marketable”, more “attractive”.¹³

This analysis suggests, however, that the department may need to make some choices with respect to the different purposes of these qualifications. If the degree

¹³ Journalism staff comments at the SANTED NMMU workshop, 20 September 2010.

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is predominantly preparation for an academic track then it may need to increase its proportion of C4 knowledge and shift towards a conceptual coherence. If the primary purpose of the degree is to produce media professionals then this raises questions about the purpose of the diploma. One option would be to phase out the diploma and develop an extended programme (four-year degree) for students who come in with lower admission points. The department can then focus on developing graduates for the field of Media & Journalism with strong conceptual foundations for both professional and postgraduate purposes.

FIGURE 4.4 National Diploma (Journalism) / BA (MCC): selection and sequencing of curriculum type

CHEMISTRY: NATIONAL DIPLOMA (ANALYTICAL CHEMISTRY) AND THE BSC (CHEMISTRY)

Selection of curriculum type (see Figure 4.5)

In the National Diploma (Analytical Chemistry):

- The overall curriculum logic is contextual, with a high and increasing proportion of C3 within each year (C3: 30% in Year 1, 50% in Year 2, 100% in Year 3).
- In contrast to other diploma case studies, there is a high proportion of C4 in Year 1 and 2 (59% in Year 1, 35% in Year 2).

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In the BSc (Chemistry):

As noted above, this analysis focuses only on the Chemistry stream within the BSc degree which constitutes 30, 40 and 60 credits in Year 1, 2 and 3 respectively. The other credits making up the other streams of the degree have not been analysed.

- The overall logic of the curriculum is conceptual with a very high proportion of C4. In Year 2 and 3 there is an exclusive component of C4.
- Surprisingly, there appears in Year 1 to be less C4 than in the Year 1 of the diploma.

Sequence of curriculum type

In the National Diploma (Analytical Chemistry):

- The main progression from Year 1 to 3 appears to be in C3. There is no apparent increase in cognitive complexity in C4 between Year 1 and 2. There is some increase in cognitive complexity in C2 between Year 1 and 2.
- In the BSc (Chemistry):
- There is a high level of cognitive complexity from Year 1 to 3.

Implications for progression and articulation

The graphic reveals clear distinctions between the diploma and the degree. The diploma is predominantly C3 and progression is in C3. The degree is predominantly C4. At the same time, both the diploma and the degree are at a high level of cognitive demand. The Chemistry staff noted that this distinction has been the subject of much debate and the focus of current rearticulation. The diploma, which started off as a “strongly technical programme” has in recent years experienced an “academic drift”. This “drift” has been picked up by industry who have complained that the technical training of the diploma graduates is “not as strong as it should be” and that “theory had taken the place of practice”.¹⁴ There is thus a concerted attempt to clearly distinguish the diploma from the degree in current curriculum review processes. One staff member noted that the logic of the diploma is that the C4 provides conceptual foundations for progression in C3. The relationship between conceptually and procedurally oriented curricula is something which requires further exploration in all the case studies.

The Chemistry case study provides an interesting example of a diploma and degree which are clearly differentiated in terms of their curriculum type, and both are at a cognitively demanding level. With respect to articulation between the diploma and the degree, it is possible that the strong conceptual foundations of the diploma could make articulation from Year 1 of the diploma into Year 1 of the degree possible, but only for a very strong student. The distinctive nature of these qualifications suggests that articulation from one to the other is not a priority curriculum issue.

¹⁴ Comments made by Chemistry staff in the NMMU SANTÉD workshop held on 20 September and follow-up e-mail conversation with Prof. Eugen Straeuli, 20 October 2010.

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FIGURE 4.5 National Diploma (Analytical Chemistry) / BSc (Chemistry): selection and sequencing of curriculum type

ARCHITECTURE: NATIONAL DIPLOMA (ARCHITECTURAL TECHNOLOGY) AND THE BACHELOR OF ARCHITECTURAL STUDIES

Selection of curriculum type (see Figure 4.6)

In the National Diploma (Architectural Technology):

- The overall curriculum logic is contextual with a high proportion of C2 and C3 across all three years (C2: 26% in Year 1, 36% in Year 2, 29% in Year 3) (C3: 57% in Year 1, 44% in Year 2, 71% in Year 3).
- There is a relatively low proportion of C4 in Year 1 and 2 (17% in Year 1, 20% in Year 2).

In the Bachelor of Architectural Studies:

- The overall curriculum logic is contextual with a high proportion of C2 and C3 in all three years of the programme (C2: 19% in Year 1, 10% in Year 2, 5% in Year 3) (C3: 66% in Year 1, 73% in Year 2, 75% in Year 3).
- There is a relatively higher proportion of C4 than the diploma (15% in Year 1, 16% in Year 2 and 20% in Year 3).

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In the National Diploma (Architectural Technology):

- There is no clear evidence of increasing cognitive complexity with respect to C3 and C4, only C2 from medium (in Year 1 and 2) to medium and high in Year 3.
- In the degree (BAS):
- There is no clear evidence of increasing cognitive complexity in C2, C3 or C4 knowledge types over the three years of study.

Implications for progression and articulation

This case study raises a number of interesting questions and issues which require further exploration. The graphic for the diploma and the degree appears at a glance to be very similar. One of the key distinctions is in the C4 modules – the design theory modules. In both the diploma and the degree they are coded at medium level of cognitive complexity. The degree however requires architectural theory across all three years, while in the diploma architectural theory is offered in Year 1 and 2 only. Furthermore, the number of credits allocated to theory in Year 1 and 2 is greater in the degree. The feedback from the staff suggests that there is also a fundamental distinction in the nature of the design knowledge which would make articulation “very difficult”. These differences were articulated in terms of differences in “core knowledge”. The diploma’s core knowledge was articulated as “How do you resolve a building problem technically and communicate this to a client?” whereas the degree’s core knowledge is based on the “creative conceptual thinking of design”.¹⁵

¹⁵ Architecture staff comments at the SANTED NMMU workshop, 20 September 2010.

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FIGURE 4.6 National Diploma (Architectural Technology) / Bachelor of Architectural Studies: selection and sequencing of knowledge and curriculum type

IMPLICATIONS FOR CURRICULUM DESIGN IN HIGHER EDUCATION

Emerging from the analysis there are some key principles for curriculum design which we offer as a contribution to the debates on differentiation, progression and articulation. These principles are preliminary and need to be tested in further case study analysis. We focus in particular on some of the key considerations for the design of strong diploma curricula.

Wheelahan (2010) argues that theoretical knowledge must be at the centre of all higher education qualifications, including vocational ones. The reason is that access to theoretical knowledge is a matter of distributional justice: if students are denied epistemic access they will ultimately be denied social access. In terms of the case studies provided above, concerns were raised about the Journalism diploma with its paucity of conceptual knowledge. Not only does this pose problems for progression to postgraduate studies and, if relevant, articulation to the degree, but it raises questions about the kind of graduate that would emerge from this diploma with respect to the critical demands of the journalism profession. Thus, in agreement with Wheelahan, this study underscores from an empirical basis that curricula in the higher education band should have a certain proportion of modules with conceptual knowledge of the

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C3, C4 or C5 type. One of the implications of this is that if a diploma does not have some proportion of C3 or C4 modules then it should not be in higher education. Exactly *what* proportion is something that requires further investigation and may be programme specific.

This principle, as well as the knowledge and curriculum distinctions that emerge from the case studies, suggests one way in which we might conceptualise differences between vocational, professional and general-formative programmes. There may be vocationally oriented programmes that are predominantly constituted by procedural or principled procedural knowledge, i.e. they have C1/C2 as their core. Their principled base emerges out of procedures and increasing complexity is achieved by more complex contexts of application. We would argue that these qualifications do not constitute higher education but would be more appropriately placed in further education. However, there may be other vocationally oriented programmes such as diplomas that are constituted by principled procedural and proceduralised conceptual knowledge, i.e. they have C2/C3 as their core. Their purpose would be distinct from professionally oriented programmes which are predominantly constituted by conceptual or proceduralised conceptual knowledge, i.e. they have C3/C4 as their core. Their principled base emerges from a conceptual or theoretical knowledge base and increasing complexity is achieved by increasing conceptual complexity and ensuring more complex contexts of application. These qualifications would lead right up to professional master's and doctoral level. General formative programmes may be defined as curricula that are predominantly constituted by conceptual knowledge, i.e. they have C4/C5 as their core. Their principled base emerges from a conceptual or theoretical knowledge base and increasing complexity is achieved predominantly by increasing conceptual complexity. These qualifications would also lead right up to master's and doctoral level.

With respect to this conceptual knowledge core, the case study analysis highlights some particular challenges for vocationally and professionally oriented curricula. Professionally oriented curricula such as the Diploma in Analytical Chemistry have a conceptual base with what Bernstein (2000) calls a hierarchical knowledge structure; there is thus less contestation about what is relevant. Those curricula such as Journalism and Media Studies have their conceptual base in horizontal knowledge structures; this is a less explicit conceptual base. They need to 'borrow' theory and concepts to build a conceptual base and there will be more contestation about what is legitimate. This suggests that the most vulnerable diplomas in terms of conceptual development are likely to be diplomas in the soft, applied sciences.

With respect to issues of progression – that is the increasing complexity from Year 1 to Year 3 – the analysis points to some key design principles. The design needs to ensure some degree of increasing cognitive complexity in the core curriculum type, i.e. C2, C3, C4, so that the curriculum expectations are at a high level of cognitive complexity by the end of Year 3. This is a particular challenge for the diploma which typically

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has a work-integrated learning component in the final year. Further investigation is needed into the extent to which these experiential learning components are cognitively demanding. Particular attention needs to be given to Year 1 and its progression from school level and Year 3 and its progression to postgraduate studies. With respect to Year 1, curriculum designers need to ensure that the necessary conceptual building blocks are in place for successful progression. With respect to progression to postgraduate studies from a diploma or degree, this will require some proportion of C4 or C5, especially in the final year.

Contrary to the political ideals of the NQF, the prospects of systemic articulation pathways from diplomas to degrees are not very promising. The key principle is that an articulation pathway between a diploma and a degree must be based on some consistency in curriculum typology. In other words, a diploma that is predominantly C2 will not articulate with a degree that is predominantly C3 or C4. Even where there is a significant proportion of C3 in a diploma, the articulation pathway into the degree (where there is significant C3 and C4) may require a 'bridge'. Given these realities it may be that at this stage the issue of articulation should not be the key driver for curriculum change for the comprehensives. Priority should rather be given to reforms which will firstly, strengthen differentiation of purpose between the diploma and the degree, and secondly, enable progression particularly at the school-university point.

CONCLUSION

The insights afforded by this research have significance beyond the concerns of comprehensives universities. While there is further work to be done, we believe that there are important implications for the South African higher education sector as a whole. The HEQF that was promulgated in 2007 is currently in a process of review and phased implementation. Work in progress on qualification descriptors and articulation and progression arrangements can usefully draw on the empirical findings offered in this chapter. The research also holds significant implications for the design of the South African post-secondary sector which is currently an important priority for the national Department of Higher Education and Training (Cosser 2010). In particular, the research provides perspectives on curriculum design and articulation possibilities within a restructured post-secondary system. Furthermore, with respect to current debates on institutional differentiation, nationally as well as internationally, this research can provide helpful perspectives on curriculum differentiation as an important dimension of the debate relating to both external and internal differentiation. The central argument of this chapter is that differentiation debates – whether focused on curriculum, programme, qualification or institution – must pay attention to knowledge.

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