PROFESSIONALLY-ORIENTED KNOWLEDGE AND THE PURPOSE OF PROFESSIONALLY-ORIENTED HIGHER EDUCATION

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Introduction

In this paper we argue that a common-sense understanding of the purpose of professionally-oriented higher education can have unintended consequences. We draw on accounts of the distinctiveness of disciplinary and situated knowledge (e.g., Bernstein, 1999; Barnett, 2006; Gamble, 2006; Muller, 2009) to describe the knowledge resources for professional programmes, to analyse the relationship between knowledge types and to show how they are represented in curricula. We draw on a number of empirical studies in the education of health professionals, engineers, designers, information technologists and office managers. Much work has been done on the nature of disciplinary knowledge and its selection and recontextualisation in curricula. We have, however, found that it is insufficient to provide a principled account of situated knowledge equipped only with a theory of knowledge difference. Without a theoretical conception of practice-based knowledge (e.g., Scribner, 1984; Chaiklin & Lave, 1993/2003) there is a danger that situated knowledge will be undervalued in relation to disciplinary knowledge. We thus found it necessary to draw on a variety of resources to theorise key issues in disciplinary and situated knowledge. The first section of the paper problematises common-sense understandings of professionally-oriented education and provides an historical overview of the complex and difficult relationship between higher education and the world of work. The second section addresses the representation of disciplinary and situated knowledge forms in curricula, highlights the importance of epistemological access to professional knowledge, and provides a model of

professional knowledge for curricular selection. The third section deals with the logic of professionally-oriented curricula. The conclusion returns to a consideration of the purpose of professionally-oriented higher education, in the light of the arguments developed. Our aim in this paper is to contribute towards an understanding of the relationship between disciplinary and situated knowledge in professionally-oriented education, and thereby to offer a theoretically consistent position on the purpose of professionally-oriented higher education.

The intentions of professionally-oriented university education

This paper grew out of a curriculum research project that was initiated at the Cape Peninsula University of Technology in 2011. The project comprises a number of empirical studies in the education of health professionals (radiographers and emergency health care practitioners), engineers (in the new field of mechatronics), information technologists, industrial, graphic and textile designers, and office managers. The studies describe the knowledge bases of the programmes, and attempt to show the relationship between theoretical and practical areas of knowledge in different programmes. The focus of this paper is the theoretical framework and the language of description developed to analyse the relationship between different forms of knowledge in professionally-oriented programmes. In addressing questions about the purpose of professionally-oriented university education, we have chosen not to focus on matters of institutional differentiation (e.g., universities of technology vs traditional universities and their respective missions), but rather on matters of knowledge differentiation. Debates around what a university of technology is and how it might be different from other forms of higher education avoids the central consideration of the purpose of professionally-oriented programmes and how students enrolled in such programmes should be prepared by higher education institutions (whatever label they are given) to engage meaningfully in the world beyond the university. The Higher Education Qualifications Framework (Government Gazette 2007) provides six higher education levels (Levels 5 – 10), with different qualifications requiring appropriate credits at different levels. While it is more common (given issues of capacity and resources) for universities of technology to offer diploma-level programmes in advanced vocational and technical fields, universities of technology can (and many

do) offer a full range of qualifications. It is useful to ask 'what is the purpose of a diploma?' and 'what is the purpose of a degree?', but in this paper our focus is more generally on the purpose of professionally-oriented university education.

By the term 'professionally-oriented' higher education we include traditional professional programmes, such as architecture, engineering, accountancy, law and medicine, as well as new and emerging professions, such as medical imaging, emergency medical care, mechatronics, software engineering, reconfigurable computing, robotics, and cellular technology. Also included are career-focused programmes such as industrial design, business informatics, and multi-media studies. In the interests of brevity, we refer to all such advanced technical, vocational, new and traditional professional programmes as 'professionally-oriented'. We are aware that some programmes at universities of technology (and probably in traditional and comprehensive universities as well) aspire to professional status, but that these programmes are either in extremely new areas and a lack a clearly defined status (e.g., there is no established professional council or similar body), or they might be programmes that are more appropriate to Further Education and Training colleges, but for various historical reasons have ended up in a university. In the tradition of Dewey (1916/1966), we have not distinguished programmes by their social status, but by their purpose in preparing candidates to engage meaningfully with the world beyond the university.

The common-sense view is that professionally-oriented programmes are expected to prepare graduates for competent practice in the world of work. However, as a critical reading of texts (such as the one below) reveals, the matter is not as straightforward as it might seem:

> Technical and engineering colleges [should] aim to convey both knowledge and practical skills, and to shape the personality of the students so as to make them fit readily into the hierarchical and authoritarian regime in the factories, the laboratories and bureaucracies.
>
> (Gorz, 1976: 179)

Although dated, the text above expresses common assumptions on the preparation of students for 'industry'. Clearly, the purpose of higher education should not be the reproduction of technical and social relations (Crozier & Reay, 2011), but rather the enablement of graduates to contribute to their fields of practice (Young, 2009), as well as their preparation for broader roles in the development of South African society (CHE, 2011). In order to achieve these aims, professionally-oriented education has to provide students with the disciplinary knowledge that underpins professional practice (Beck & Young, 2005), as well as facilitate the acquisition of specific skills and knowledge for competent practice (Wheelahan, 2010). Curricula that do not pay adequate attention to disciplinary knowledge – or that neglect the situated knowledge related to a field of practice – do not provide a coherent professional knowledge system for professional education. Students need to engage with a system of knowledge in order to understand how discrete elements of practice relate to the rest of the system. This paper thus argues that in order to ensure a strong basis for practice, students need disciplinary knowledge; while to develop an understanding of the field of practice, students need situated knowledge. For these reasons professionally-oriented education is said to 'face both ways' (Barnett, 2006: 152), that is, both towards the underpinning disciplines and towards the field of practice.

Attempts to define the relationship between higher education and the world of work have a long (and troubled) history. A language of description for distinguishing between different knowledge forms was made available by Aristotle, who differentiated theoria (ideas and theories) from poïesis (knowledge about practice) and praxis (action or conduct) (Di Pippo, 2000). Poïesis (derived from the word 'to make') is knowledge that has as its aim something beyond itself, for example, knowledge about shipbuilding that has the aim of producing a vessel. Poïesis informs techne (craft or design), while phronesis (reason-in-action) informs praxis: 'the state involving reason that is concerned with craft is different from the state involving reason-in-action' (Aristotle, 350 BC/1994). Subsequent theorists have tended to conflate poïesis and praxis, thereby establishing a tradition of understanding 'theory' and 'practice' as separate, unrelated domains.

A number of scholars categorise disciplines based on whether they are more theoretically or more practically oriented. Biglan (1973), for example, separates disciplines along two dimensions, concluding that there are four disciplinary types: 'hard pure' (e.g., physics), 'soft pure' (e.g., sociology), 'hard applied' (e.g., engineering), and 'soft applied' (e.g., education). Biglan's typologies and taxonomies invoke Habermas' (1984) classification of the knowledge worlds of the humanities, the 'empirical-analytic sciences', and the 'sciences of social action'. Whitely (1984) differentiates between disciplines according to their research practices, in particular the degree of 'technical task uncertainty' present in the field (how much variability there is in the problems being examined) and 'strategic uncertainty' (how much instability there is in the way that research is conducted). In Whitely's view, research in a field such as engineering is typified by 'technical task uncertainty' because, although it has long-established base disciplines (e.g., physics and mathematics), its research routines are subject to local considerations and exigencies. Organisation Studies, on the other hand, is noted for its 'strategic uncertainty', which is a result of the lack of paradigmatic consensus in the field, and concomitant theoretical and methodological openness or eclecticism. Bernstein (1999) identifies 'vertical' and 'horizontal' discourses; vertical discourses are associated with abstract, theoretical ways of knowing, while horizontal discourses comprise both everyday or common sense ways of knowing as well as 'uncommon sense' ways of knowing (e.g., the horizontal 'repertoires' of professionals that include multiple practices, most of which are not 'everyday' because even though they are context-specific, they develop from reservoirs of 'vertical' discourse). Max-Neef (2005) clusters disciplines according to whether they describe 'what exists' (the first, empirical level), what we are 'capable of doing' (the second, productive, level), what we 'want to do' (the third, planning, level), or what 'we should do' (the fourth, ethical, level). Muller (2009) describes disciplinary differences in terms of epistemological, methodological, communicative, professional, and educational variables, focussing on how these variables characterise general, professional and vocational curricula.

A number of scholars, following John Dewey (1916/1966), are concerned with the (presumed) benefits of engaging both 'heads' and 'hands' in curricula and pedagogy. Kolb (1981) characterises disciplines according to the ways

in which they demand that students learn; he places these disciplines along two continua which he calls 'active-reflective' (e.g., the social sciences) and 'abstract-concrete' (e.g., the natural sciences); while Neumann, Parry and Becher (2002) analyse different disciplinary orientations to teaching. Schön (1983) attempts to reconcile theory and practice through the concept of 'reflective practice', Lave and Wenger (1991) theorise 'situated knowledge', Kemmis (2005) proposes 'knowing practice', Titchen (2000) suggests a hybrid form of 'professional craft knowledge', Richardson, Dahlgren and Higgs (2004) propose an 'epistemology of practice', while Gibbons et al. (1994) and Nowotny and colleagues (2001) are preoccupied with knowledge production in contexts of application.

Contestation of the relationship between theory and practice persists in the ways in which the purposes of higher education are understood. Positions are taken in support of, or against, higher education qualifications frameworks, outcomes-based education, service learning, graduate attributes, industry/higher education collaboration, interdisciplinary programmes vs departmental 'silos'; one group will claim that the innovation or policy makes too many concessions to vocational higher education, while another group will claim it forces 'academic drift' in technical programmes.

Epistemological access to professional knowledge

We can think of professionally-oriented curricula as drawing on two distinct knowledge domains: disciplinary knowledge (the disciplines or areas of study that form the foundation of professional programmes) and situated knowledge (the knowledge underlying specific work practices and the contextual knowledge associated with the sites of practice). Universities that are in the business of offering professionally-oriented education need to engage students with both disciplinary and situated knowledge in ways that support the provision of 'epistemological access' (Morrow, 2003/2009) to professional knowledge. How universities could address this provision, and the purpose that shapes this provision, is the issue that we speak to in this paper.

This paper draws its basic premise from Bernstein's (1999; 2000) understanding of the internal and external relations of knowledge in

terms of 'vertical' and 'horizontal' discourses. Bernstein (2000) argues that vertical (or abstract theoretical) discourse underpins the knowledge base of professional practice. This 'powerful knowledge' enables 'more reliable explanations and new ways of thinking about the world than localised experiential knowledge, and acquiring it can provide students with a language for engaging in political, moral and other kinds of debates' (Young, 2009). Wheelahan (2010), developing these arguments, proposes that access to abstract theoretical knowledge in a university education is a question of social justice, because 'powerful knowledge' is not only the basis for professional work, but is the basis for participating in 'society's conversation', for engaging in debates and controversies in the field of practice, and contributing to its development.

Situated knowledge is not generally valued as 'powerful knowledge' in academic contexts but in professional practice it has significance. It would, for example, be unthinkable to educate doctors without access to the situated knowledge of clinical practice (Richardson et al., 2004); or architects without access to building sites (Young-Pugh, 2005). Developing graduates who are knowledgeable and competent practitioners requires coherent curricular selection from the disciplines that underpin the profession and the situated knowledge that enable its practice. In professionally-oriented programmes (both new and traditional) it is sometimes not clear why particular selections have been made. One could ask: 'what is the purpose of general physics (mechanics, optics, magnetism, acoustics, heat) in a software engineering curriculum?', or 'what is the purpose of a work-placement in a financial accounting programme?'.

Disciplinary knowledge in the professional curriculum

Disciplinary knowledge provides the scientific basis for the profession (Beck and Young, 2005). Mechanical engineering, for example, is based on the pure and applied disciplines of physics, mathematics, mechanics, and materials science. University teachers select and sequence disciplinary knowledge to develop a curriculum. Disciplinary knowledge, particularly the knowledge forms associated with the pure disciplines or 'singulars' (Bernstein, 2000) are strongly classified, 'internally oriented' (i.e., have a logic and coherence that is specific to the discipline), and have clear boundaries between

themselves and other areas of knowledge. Such disciplines are specialised knowledge areas, each having a unique name, such as 'Physics' or 'Sociology' (Wheelahan, 2007); they are made up of specialised languages with rules that stipulate what is included in the discipline as legitimate knowledge, how knowledge is created, how texts are written, as well as the rules of entry and reward (Bernstein, 2000: 52). The applied disciplines are described by Bernstein (2000) as 'regions' of knowledge that face outwards towards the field of practice. Bernstein explains that in applied disciplines, singulars are 'recontextualised', that is, codified into 'larger units' that 'operate both in the intellectual field of disciplines and in the field of external practice' (2000: 52). Applied disciplines are thus 'the interface between disciplines (singulars) and the technologies that they make possible' (2000: 52).

Professionally-oriented programmes usually include elements of both pure and applied disciplines. Beck and Young (2005) distinguish between the 'old' regions represented by the traditional professions, and the 'new' regions represented by new vocational or technical higher education programmes. They argue that professional identity is strongly built into the traditional regions because of the historical linkages between the professions and their knowledge bases. Traditional professions place strong emphasis on professional autonomy as well as professional control over training and admission to the profession, through defining the boundaries of their knowledge base, the development and enforcement of codes of conduct, and socialisation within the profession, or in other words, 'the creation of a professional habitus' (Beck and Young, 2005: 188).

The neglect of appropriate disciplinary knowledge, particularly in the new professions and emerging technical areas of practice, has been pointed out in critiques of competency-based education (such as unit standards-based programmes). Many new programmes, in preference to specifying knowledge domains, list topics or skills – with no pedagogic or curricular coherence, and even less relevance to practice. Wheelahan (2007) argues that such programmes ignore the essential unity of disciplinary knowledge that underpins practice. When students are not engaged in the study of the disciplinary bases of their field, they are not provided with the opportunity to learn how disparate elements are linked to a system of knowledge.

Wheelahan (2010) argues that it is important to provide students with opportunities to acquire systematic disciplinary knowledge to enable them to develop the kind of thinking that emerges from such engagement. But while disciplinary knowledge is increasingly seen to be important in professionally-oriented education, the introduction of disciplinary knowledge that is misaligned with the field of practice is not helpful. Studies that emphasise the importance of the theoretical knowledge that underpins all but the most routine work, often fail to point out the importance of appropriate and meaningful curricular selection. The inclusion of geo-history in soil formation in a Construction Management diploma (Allais, 2011), for example, is clearly not 'powerful knowledge' for this profession. Misalignment is a particular concern in new professions that do not yet have a clear and stable disciplinary base for their practice.

Situated knowledge

While knowledge forms in the pure and applied disciplines are well understood, knowledge forms that enable practice have been less researched. Perhaps because theorists and researchers are in the business of forming ideas and theories, and because of their particular role in the initial preparation and formation of professionals, they sometimes treat disciplinary knowledge as being of most worth, 'as if what is of most worth within the academy is also of most worth in the world beyond it' (Kemmis, 2005: 409).

Codifying situated knowledge

There are a number of difficulties to overcome when including situated knowledge in professionally-oriented curricula. Because much situated knowledge is not codified (and some practices are not amenable to codification), it is difficult to access situated knowledge outside of its context of use. Knowledge developed in practice is often tacit, and is acquired in a more social way, through participation in teamwork, mentoring, and so on. Richardson and colleagues explain some of the difficulties in medical practice:

> The move towards evidence-based practice provides an impetus for all practitioners to examine their practice. This can become a demoralising process when it is realised that so little professional practice has been researched and that existing research is often considered to be of such poor quality that little evidence can be gleaned from it for generalisation
>
> (2004, p.212).

One approach to the codification of situated knowledge can be seen in calls for 'generic' competencies that are largely drawn from the field of practice (and the ironic inappropriateness of codifying situated knowledge through appealing to the generic should be noted). There are a number of difficulties associated in describing 'performance' generically. Firstly, as Bernstein (2000) argues, generic capacities can only be loosely related to the practice for which individuals are preparing, because it is the specific professional practice (and traditions associated with that practice) that provide occupational identity. Thus a specific context is required in order to make sense of generic 'meta-thinking' and 'meta-learning' strategies. In generic approaches, the 'fit' between qualifications described in terms of outcomes, or other generic attributes, and the occupational destinations for which students are being prepared is therefore so imprecise that it is of little use.

Bernstein (2000) locates the driving force of professional identity as being centred on the relationship that practitioners have with knowledge, a relationship characterised as 'inwardness' and 'inner dedication'. Bernstein's analysis suggests that professionals operate within a context that includes not only the external conditions of change, but the internal basis of change and that an awareness of the interrelationship between the two at any particular time determines the nature of professional consciousness, commitment and rigour. Building on Bernstein's analysis, Beck and Young (2005) warn that the shift towards generic competencies undermines the training of critically-thinking professionals. As an exacerbating factor, Wheelahan (2007) points out that in many 'generic' descriptions (within vocational programmes in particular) the competencies are oriented outwards to markets and not to a field of

practice, which severs the link with disciplinary knowledge entirely, as well as changing the relationship between the higher education institution and the world of work.

Principled and procedural situated knowledge

The process of codification, as well as the nature and structure of university subjects, is such that situated workplace knowledge has to be adapted to the academic context. Academic discourse is able to recontextualise other discourses, such as the discourses of professional practice, but it does so by appropriating and transforming them to conform to its own distinctive logic (Maton, 2004), thus some of the distinctiveness of practice is lost. University teachers who have attempted to bring real projects into the classroom, for example engineering projects or medical case studies, will be familiar with these difficulties. In selecting appropriate cases for students to analyse, university teachers raise questions such as: 'Is there sufficient mathematics involved in this 'real' problem?' or 'How can I, as an academic biochemist, bring practical laboratory work into my curriculum?' On the one hand, 'recontextualisation' can be seen as advantageous because this process enables university teachers to adapt 'real life' problems and case studies to the particular needs of their students and the academic programme; but recontextualisation also means that the problem or case study is no longer authentic, and may cause confusion to both students and professional partners. As Barnett puts it:

> Situated knowledge … does not readily mix with, or easily relate to, disciplinary knowledge. It is often trapped within its context of application, while disciplinary knowledge generally aspires to some degree of context-independence.
>
> (2006: 146)

Gamble (2009) describes situated knowledge in terms of two main types: 1) principled and 2) procedural (reminiscent of Aristotle's poïesis and praxis). In terms of adaptation for curriculum development, these could be understood as 'codified' and 'uncodified' knowledge forms. Principled situated knowledge is likely to be codified, in that many of the principles of particular practices are founded on related disciplinary forms of knowledge.

Procedural situated knowledge is less likely to be codified (even though particular procedures may be documented, these procedures will be susceptible to contextual change). Procedural situated knowledge thus needs to be acquired through practice.

A model of professional knowledge for curricular selection

Thus far we have identified two knowledge types from which curricular selections can be made: disciplinary knowledge (comprising the pure and applied disciplines – both 'old' and 'new') and situated knowledge (the 'principled' and 'procedural' knowledge of professional practice). In most models of professional or vocational knowledge (e.g., Barnett, 2006; Muller, 2009) the two knowledge types are understood to occupy different ends along a continuum: situated knowledge developed in the world of work at one end and specialised scientific knowledge on the other. Barnett (2006) explains that the development of vocational curricula involves a process of 'double recontextualisation' in which both disciplinary and situated knowledge are 'recontextualised' into a curriculum. The concept of 'double recontextualisation' helps us to understand the structure and content of a professionally-oriented programme as one that both shifts the discourse of practice from its contextual base and relocates it within a university, and one that shifts the discourse of disciplinary knowledge towards an understanding of the world of work. This 'double recontexualisation' creates a space in which students can learn from the disciplines, as well as learn about, and from, their future places of work.

It should be remembered that Bernstein (1999) presents the distinction between vertical and horizontal discourses as 'ideal types' which, as Young points out, are analytical categories that 'do not describe different types of knowledge; they refer to features found to a different degree in all claims to knowledge' (Young, 2005: 11). All knowledge-based fields will therefore comprise aspects of verticality and horizontality in different combination. Thus it might be possible to understand the two knowledge domains as operating along two continua rather than along a single continuum.

From the above description, a model of professional knowledge emerges that is based on differentiation between disciplinary and situated knowledge – as well as the potential for a variety of different relationships between the two. Professionally-oriented curricula would contain both forms of knowledge, but within each of these forms, a further distinction between 'pure' and 'applied' disciplines, and 'principled' and 'procedural' situated knowledge can be made. We can use this model to distinguish between knowledge areas within a curriculum, but also to provide some of the detail that is missing from some knowledge-based approaches. In knowledge-based approaches, disciplinary knowledge tends to be foregrounded and valued, while situated knowledge tends to play a minor, supporting role. Figure 1 shows the distinctness of disciplinary and situated knowledge types, but also shows that there are potential relationships between these domains:

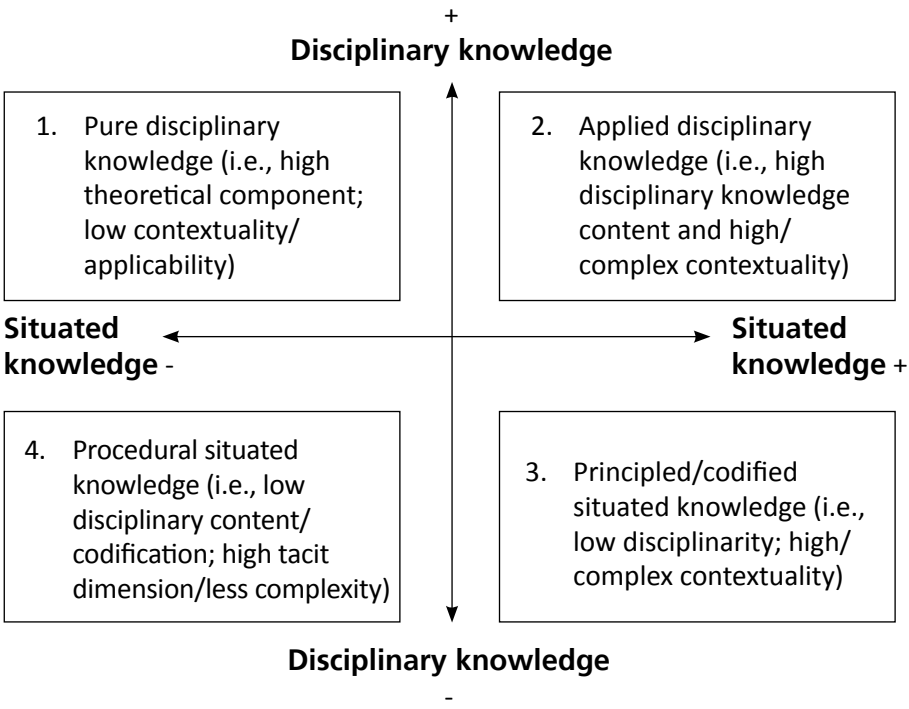

Figure 1: A model of professional knowledge

We can recognise Quadrants 1 (pure disciplinary knowledge), 2 (applied disciplinary knowledge) and 4 (procedural situated knowledge – also known as a practicum, work experience, internship, cooperative education, etc.) in many professionally-orientated programmes. Many professionally-oriented programmes include a work placement, and in the past in situ learning was the accepted way of acquiring professional knowledge (Ryan, Toohey & Hughes, 1996). However, when forms of apprenticeship were common, it was understood that acquiring the knowledge, skills and a broader set of attitudes and values associated with becoming a member of a profession developed over a considerable period of time, usually seven years or more (Allais, 2011). Some new professional programmes (or those that aspire to professional status) over-emphasise the practice-oriented 'know-how' (Quandrant 4) necessary for professional tasks, without paying sufficient attention to the disciplinary core (Quadrants 1 and 2), resulting in the knowledge base being weak on 'know-why' and professional identity (Muller, 2009). Examples abound in many three-year diploma programmes (e.g., in some engineering, design and business fields) where a whole year practicum is included, usually at the second year level. It is unlikely that students will have developed the systematic professional knowledge necessary for meaningful practice or contextual engagement after only one year of study. Principled situated knowledge (Quadrant 3), or knowledge about practice (Aristotle's poïesis) has tended to be neglected in the education of professionals, although such knowledge, which is usually codified, is central to the achievement of competent practice (Chaiklin and Lave, 1993/2003). There are programmes, in particular new four-year degree programmes in the health sciences, that include more systematic ways of preparing students for practice, and for relating the principles of practice back to their disciplinary roots.

The 'epistemological dilemma' and the logic of professionally-oriented curricula

The distinctiveness of disciplinary and situated knowledge types – and their centrality to the education of professionals – could be understood as an 'epistemological dilemma'. Because academic and situated knowledge domains are different, separate and bounded (Bernstein, 2000; Maton & Moore, 2010; Muller, 2009; Young & Muller, 2010), even within the same

professional knowledge system, there are strong arguments for keeping the knowledge domains distinct. This is supported by research that shows that meanings in science operate at a general and context-independent level (e.g., Saunders, 2006); if science is learned in a practical context there is a danger that the knowledge learned will remain bound to that context and its transfer capacity lost (Gamble, 2006).

The achievement of coherent selection and sequencing of disciplinary and situated knowledge is extremely difficult; but it is not the inclusion of situated knowledge in professional programmes that is problematic. Difficulties arise when curriculum developers assume that disciplinary and situated knowledge types are similar and interchangeable: "Knowledge is often viewed as undifferentiated – 'generic' skills or interchangeable packets of information – and the basis of its selection and sequencing in a curriculum seen as arbitrary" (Maton & Moore, 2010: 6-7).

The difficulties described above can partially be addressed by bringing disciplinary and situated knowledge into a more clear relationship within a logically sequenced programme. Resolving the 'epistemological dilemma' requires university teachers to consider not only when (in terms of curricular sequence and pace) disciplinary or situated knowledge is appropriate in a professionally-oriented programme, but how the particular academic and situated knowledge domains relate to each other, as well as the principles for their selection into academic programmes.

In making choices about selection, sequence and pace there is much to be learned from traditional professional programmes. Professional engineering programmes, for example, foreground disciplinary knowledge (e.g., mathematics, physics, strength of materials) in initial curricular selections, while only towards the final years of study are elements of the professional field (e.g., in the form of simulated workplace projects or actual work placements) introduced into the programme. Other professional programmes, particularly in the medical and the health sciences, bring the world of professional clinical practice into the curriculum from early on. From the student perspective, situated knowledge, in the form of engagement in work-based projects comprise some of students' more memorable learning experiences (Billet, 2009); while it is only in retrospect,

from the perspective of employment, that students come to understand and appreciate the importance of mathematics and physics in, for example, an engineering programme (Stiwne and Jungert, 2010). Whether the situated component is introduced earlier or later, in simulated or actual form, there should be a clear understanding of the professional knowledge system. Such systems underpin complex situated knowledge with clearly defined disciplinary bases. In curricula, this necessitates a logical movement from the disciplines to practice, rather than the other way around. This logical movement is represented in Figure 2:

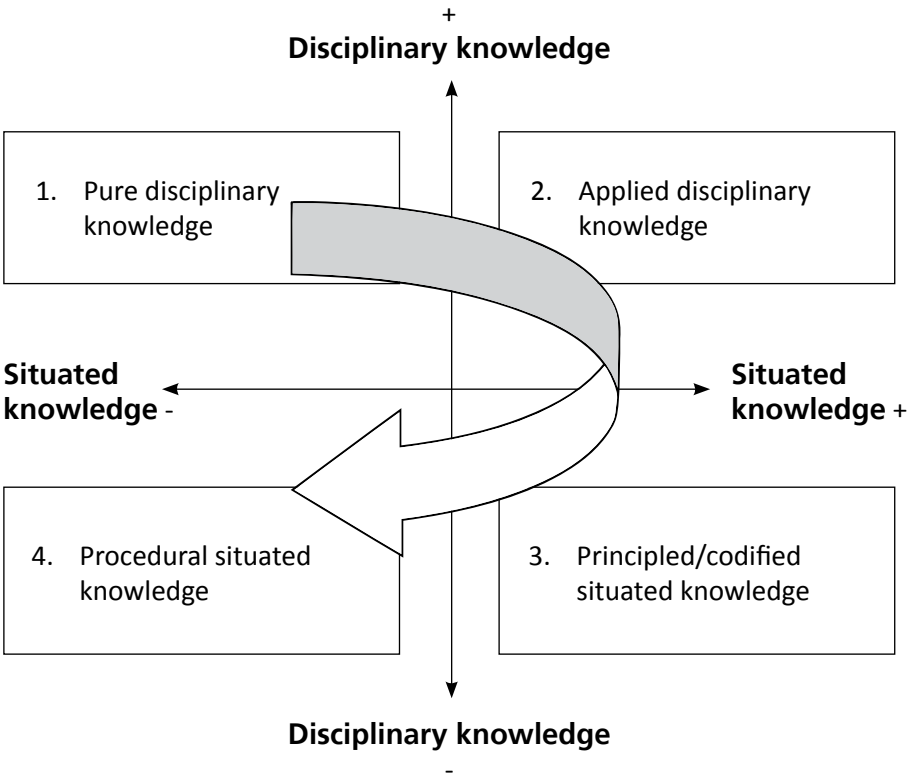

Figure 2: The logic of professionally-oriented curricula

A programme is the new field of Emergency Medical Care provides an example of a logical curricular sequence. The field has learned much from traditional health science programmes in which there is movement from theory to practice in several cycles. For example, students initially engage in a general study of the respiratory system through a (relatively) pure discipline, such as 'Anatomy' (Quadrant 1), this is followed by a more focussed, specific application within an applied subject, such as a module on the 'Theory of Resuscitation' (Beckers, Timmermann, Müller, Angstwurm & Walcher, 2009) (Quadrant 2). A third curricular shift occurs as students familiarise themselves with the principles and protocols of patient resuscitation that are codified for different contexts or different patient injuries, in a practice-based subject (Quadrant 3). In the practicum students develop their understanding as they carry out protocols (or have to attempt new actions) in sites of practice (Quadrant 4). In this way, the Emergency Medical Care curriculum develops students' reservoirs of disciplinary knowledge and the repertories (principles and protocols) for professional practice.

In professional practice (as distinguished from professional learning) there is what Bernstein calls 'circulation' between the disciplinary 'reservoir' and the 'repertoires' of practice in both directions (Bernstein, 1999); but this is not the logic of the professionally-oriented curriculum. Similarly, in knowledge building and research practice, or in advanced professional learning (clearly different from undergraduate learning) there is also movement from the field of practice back to the disciplinary worlds. Layton explains that 'Solving technological problems necessitates building back … all the complications of "real life", reversing the process of … recontextualising knowledge' (Layton, 1993: 59). In the research of emergency health care practitioners, for example, disciplinary knowledge can be extended and changed by the challenges encountered in new and different situations of medical emergency.

Conclusion: from professionally-oriented knowledge to the purpose of professionally-oriented higher education

Students in professionally-oriented programmes need epistemological access to both disciplinary and situated knowledge: they need opportunities

to immerse themselves in the academic disciplines that form the basis of their future professions, and they need opportunities to acquire poïesis and praxis, situated knowledge developed from, and within, the world of professional practice. They need to identify themselves as university students engaged in complex processes of disciplinary learning; as professionals-in-training, they need to be adequately prepared to engage with, and contribute to, the world of professional practice.

For professionally-oriented higher education to achieve its purpose of educating students to become competent practitioners, with a sense of civic and social responsibility, there should be 'a common understanding about the role of universities in development and the contribution of new knowledge to it' (Muller, 2011). Educating graduates who will be worthy representatives of their professional group, and of the service that they are responsible to provide, necessitates, on the one hand, protecting the underpinning disciplinary knowledge of the profession from short-term, utilitarian and instrumental ideas of education, geared only to the minimal preparation of practitioners for an assumed site of practice; but it must also be recognised that the underpinning values, proper scope and potential of the professional field can only be clarified if university teachers and students engage with practice and interrogate it, usually with the help of the discourses of appropriate disciplinary fields. The pure and applied disciplines (particularly the traditional disciplines) offer the resources of argumentation, the analytic and conceptual tools, for professional understanding. Competent professional practice requires appropriate disciplinary knowledge to enable cumulative theory building and the progression of the field of practice; but competent practice also implies knowledge about, and knowledge within, the field of practice. The key attributes of professional programmes that are fit for purpose involves both disciplinary specialisation and practical expertise; it is the purpose of professionally-oriented higher education to get this right.[1]

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