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BEYOND TRANSMISSION – INNOVATIONS IN UNIVERSITY TEACHING

FOREWORD BY
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A Research-based Approach to University Curriculum Development that Prepares Students for Subsequent Practice

Jesper Piihl and Kristian Philipsen

Introduction

The quest in higher education to go beyond transmission involves creating student-producers (Dobozy, this volume). But in what way should we create student-producers in the research-based setting of universities which at the same time strive for practical relevance for professionals after graduation? Donald A. Schön suggests that after graduation many professionals are faced with a dilemma:

> *"Shall he remain on the high ground where he can solve relatively unimportant problems according to his standards of rigour, or shall he descend to the swamp of important problems where he cannot be rigorous in any way he knows how to describe?" (1995:28)*

Schön describes this as a dilemma between rigour and relevance. University-based educational programmes can easily find themselves in the same dilemma. The universities have a special task in delivering teaching based on research which can be interpreted as teaching with

a strong and dominant element of rigour. In contrast, the quest for relevance tends to focus on important and practical challenges which demand competence to act in enterprising ways in professional situations.

If we follow Schön's argument, educational programmes based on research and enterprising behaviour in professional situations would appear to be mutually exclusive.

One way to overcome the dilemma between rigour and relevance is to make sure that students are presented with research-based knowledge and methods as well as being faced with the need to solve practical challenges during their study. Our experience from a bachelor degree programme in business administration, innovation and entrepreneurship shows that many students do not recognise the dilemma between rigour and relevance; instead they experience two separate worlds that have very little in common!

Our efforts with teaching entrepreneurship and innovation courses and being responsible for developing the curriculum of the entire bachelor study programme have made us curious to understand the theory underpinning the mix of research and practice in curriculum development. Within business disciplines the research-practice gap has been discussed in the literature (Syed *et al.*, 2010), and some authors see teaching as one way to bridge this gap (Burke & Rau, 2010). The literature tends to divide the research-practice gap into two separate gaps and deal with them in isolation: one gap between research and teaching, focusing on how to bring research-based knowledge into the classroom and another gap between teaching and practice which is focused on developing informed and thoughtful managers.

Instead of treating this issue as two separate debates we will, in this chapter, view it as one debate concerned with interpreting research-based teaching that develops students as knowledge producers through working with and like researchers (Fibæk-Laursen, 1998). However, since most of our students are not going to stay on the high hard ground by turning into researchers in their future career, we need to resolve the dilemma suggested by Schön. In this chapter we therefore expand our image of knowledge production by building on the distinction between knowledge production in the two Modes defined by Gibbons *et al.* (1994).

"Mode 1" describes a classical idea in which knowledge production takes place in research institutions working with defined disciplines that

because of their delimitations are relatively homogenous across academic fields. Mode 1 has a hierarchical structure in which quality control follows logics of objectivity and independence and is checked by peer reviews. Mode 1 can be said to correspond to Schön's demand for rigour.

Unlike the knowledge production of Mode 1, "Mode 2" examines the idea that knowledge production is not confined to only one place and is closely connected to application contexts. Knowledge production in Mode 2 is dispersed among a number of parties including universities, customers, firms, institutions, organisations, single persons etc. Mode 2 delimits its problems on the basis of the application context in contrast to the way in which the disciplines are divided in Mode 1. This makes the knowledge of Mode 2 seem more heterogeneous. In Mode 2 the quality control consists of a so-called reality check in which the quality is judged by the actors of the specific application contexts in which knowledge is produced and unfolds during specific actions. In this respect, Mode 2 can be said to correspond to Schön's demand for relevance.

Within curriculum development theory, relevant theoretical concepts like competence-in-practice (Nygaard & Holtham, 2008) can contribute to explaining the practical part of knowledge. However, Nygaard and Holtham (2008) primarily examine *learning* competence-in-practice and do not reflect on what it means to be competent-in-practice and how this links to curriculum development and research-based teaching.

Following the arguments above, the question we ask is: how do we develop university curricula, emphasising research-based teaching in which the students are seen as producers, in ways that make better practitioners?

These issues are investigated through the development of a theoretical frame of reference in which the question is discussed in relation to knowledge production in Mode 1 and Mode 2 (Gibbons *et al.*, 1994). The contribution of this theoretical frame of reference is a broad typological description of how theoretical fields of knowledge relate to different perspectives on how a competent practitioner makes use of different areas of scientific knowledge in subsequent practice – or what we term "theory-of-application". The investigation of theory-of-application is related to students' learning situation and, in particular, to curriculum developers' perspectives on how to develop a curriculum to match theory-of application.

This chapter is structured into the following sections. Firstly, we briefly sketch central themes in overall curriculum theory in order to position our contribution in relation to the overall theme of this anthology. Our starting point for discussing issues regarding curriculum development is our personal journey from teaching and researching entrepreneurship and innovation to being responsible for entire study programmes. The second section dwells on two challenges emerging from the clashes between pedagogical developments within the specific field of entrepreneurship to the broader fields of business economics and social sciences. In the third section these building blocks are combined into a theoretical framework for discussing curriculum development which balances different conceptions of the relationship between rigour and relevance. The final section illustrates how this theoretical framework relates to different lines of study and how application can be built into curriculum in different ways.

Curriculum Theory and the Link to Practice

Nygaard & Holtham (2008) distinguish between content and process perspectives on curriculum development and discuss five concepts to be taken into account when developing a learning centred curriculum:

- People base their learning on their individual experiences and expectations;
- Learning is an individual as well as a social process;
- Learning is contextual and tied to specific situations;
- Learning is affected by the identity of the learner;
- Learning is affected by the learner's social position and the learner's embeddedness in social collectives.

Following Schön's ideas introduced above, teaching aiming at knowledge with a high degree of rigour does not in itself develop the competences needed to deal with problems of high relevance. Instead Nygaard & Holtham (2008) discuss the idea of competence-in-practice as *"the ability to apply one's knowledge and skills so the task at hand is solved in a way which is recognized by relevant peers as being competent"* (our emphasis added).

The literature on curriculum theory views the relationship between educational programmes and practice from different angles. Several studies discuss the expectations of students about the link between formal education and professional working life (Abrandt Dahlgren *et al.*, 2008; Dahlgren *et al.*, 2005). Tynjälä *et al.* (2006) examine the long term effects of university education by making graduates reflect on what aspects from their formal education they use in their professional career. They report that 64% of the respondents said that the most important skills they needed in their job were learnt at work while only 14% reported that these skills were learnt during their university education. In short, empirical evidence that supports Schön's conjecture.

A common theme in the literature on the relationship between university education and practice is that students are held to be the focal point of interest. The perspective on the students as the "journey men" between different contexts (Dahlgren *et al.*, 2005) comes in different ways. Firstly, in discussing learning-centred curriculum development the focus is the learning of the students. Secondly, in discussing the expectations of the students, the link between education and professional life is the main concern. Thirdly, when studying graduated students' experience of the relationship between education and practice, the retrospective reflections must be dealt with. The final perspective is concerned with targeting students' perceptions about what it means to be a professional.

Challenges to Curriculum Theory from the Field of Entrepreneurship Teaching

Having our professional roots in entrepreneurship and innovation research and teaching, and now targeting curriculum development in broader terms, we perceive two chief challenges:

- Challenge 1: How do we develop competence-in-practice?
- Challenge 2: Does real life professional work match the implicit assumptions about practice which are built into the content and processes of our teaching and what is the theory-of-application in different academic fields?

Concentrating on the first challenge, entrepreneurship and innovation is seen in many countries as a way to assure economic growth and

prosperity in society (Acs & Szerb, 2007; Thurik & Wennekers, 2004). As a result there is strong political interest in developing entrepreneurial skills among university students. However, it quickly becomes difficult to explain how reading entrepreneurship literature would develop the skills for actually being an entrepreneur. Management researchers like Drucker (1985) argue that *"entrepreneurship is neither a science nor an art. It is practice. ...what constitutes knowledge in practice is largely defined by the ends; that is, by practice"*. Although Drucker it is not offering a how-to book his argument is concerned with the practice both of innovation and of entrepreneurship. He views the practice as dealing with what, when and why (Drucker, 1985:vii-viii). Though Drucker defines innovation and entrepreneurship practice he does not explain how students are going to learn it. From our own teaching practice we have seen that internship (the situation in which students are temporarily affiliated by a firm or an organisation) raises questions about the relationship between both forms of knowledge, theoretical and practical, because both types are present simultaneously for the students.

There is a need to ask how the knowledge developed through the curriculum is supposed to be employed and create value in practical situations. In the literature this is certainly not a new question or challenge (Biggs & Tang, 2007); however, in contemporary universities it is easy to find course descriptions in which this link is not necessarily obvious.

The second challenge might not be obvious to the same degree. It is concerned with the idea that the nature of practice does not always match the implicit assumptions regarding practice which can be said to be implied by the traditional research-based knowledge communicated through a traditional transmission model. Tynjälä *et al.* argue that:

> *"Paradoxically, expertise being collective poses challenges to individuals. Sharing knowledge, working in networks, communicating with professionals from other fields, all these require social interaction and interpersonal skills of individuals. Thus, professional expertise is much more than having a strong domain-specific knowledge base".* (Tynjälä *et al.* 2006:75)

This concern about expertise as a collective and not an individual element poses challenges to the content-focused transmission model.

Furthermore, these authors argue that the conditions for knowledge production have also changed:

> *"New kinds of industrial production are dependent not only on new information technology but also on new kinds of expertise. Knowledge production has extended from universities to the areas of application. The dichotomy of basic and applied research is fading. Work organisations are not only using and applying knowledge produced in the university but they are also producing, transforming and managing knowledge by themselves to create innovations. In other words, many organisations have become knowledge intensive innovation centres in which collaborative work, networking, and transformative and creative learning have become key concepts in organisational development. And this applies not only to large private sector production."* (Tynjälä *et al.*, 2006, p. 74)

These ideas suggest that developing a learning centred curriculum with emphasis on building competence-in-practice needs to be based on relevant conceptual and theoretical understanding regarding the nature of practice and specifically how the competent practitioner is expected to make use of their professional training in practical situations. In their work, Biggs & Tang (2007) do make connections between learning and the context of application in arguing that intended learning outcomes should be formulated in the form of *"verbs that the students have to enact as appropriate to the context of the content discipline"* (Biggs & Tang, 2007:59). However, they do not link their discussions to different forms of knowledge production within different academic disciplines.

Therefore, we see a need for contributions linking curriculum and practice; not in terms of "student as journey man" connecting two different worlds but in terms of a form of theory-of-application related to various scientific knowledge areas in the curriculum. Taking any specific domain of knowledge, we need to start asking for an explication of that knowledge area's implicit assumptions about how this knowledge is expected to produce value in real life professional applications.

Furthermore, while recognising the definition of competence-in-practice presented above, we see a need to examine it in the context of a task in hand. When the practitioner has a clear and mutually accepted definition of the task in hand it might be possible to deal with it in ways that peers will recognise to be competent. However, in many practical situations,

the professional practitioner will be confronted by important problems but task in hand may not be obvious – especially in situations where s/he is expected to drive innovative processes. The primary concern will be to identify, frame, legitimise and communicate the task in hand.

Therefore the theoretical framework developed in this chapter intends to open a discussion of implicit assumptions regarding application in different theoretical fields and forms of knowledge production.

Development of a Theoretical Frame of Reference

Lave and Wenger (1999) distinguish between teaching curriculum and learning curriculum. Teaching curriculum refers to the ideas put into the curriculum by the persons developing it, i.e. intended learning outcomes, intended types of teaching, intended learning behaviour etc. Learning curriculum on the other hand refers to the curriculum seen from the perspective of the learner/student and thereby refers to the personal objectives of a given learner with his/her particular background and intentions.

The specific purpose of this section is to develop a theoretical framework in which we can, in a structured manner, describe, analyse and clarify the challenges of developing university curricula aiming to achieve both rigour and relevance. Therefore this section deals with teaching curriculum and we also address how the concept of learning curriculum can be utilised to address the issues discussed.

The need for relevance and competences to act in enterprising ways makes it clear that we need to relate our curricula to the ways of working in the communities to which the students are expected to contribute after graduation.

To address this we have developed a two-dimensional, theoretical frame of reference with the following axes:

- A vertical spectrum spanning from scientific knowledge areas to the graduate's professional behaviour in the context of application. In the centre of this spectrum is the intended student learning behaviour. Above the centre line are the elements bridging between scientific knowledge areas and intended student learning, which are the elements included in the teaching curriculum. Below

the centre line are ideas regarding the elements bridging between the intended student learning and expected behaviour as a competent professional – which is what we term theory-of-application.

- The horizontal spectrum spans two institutionalised impressions of knowledge production. On the left side, Mode 1 theory of knowledge production, and Mode 2 on the right.

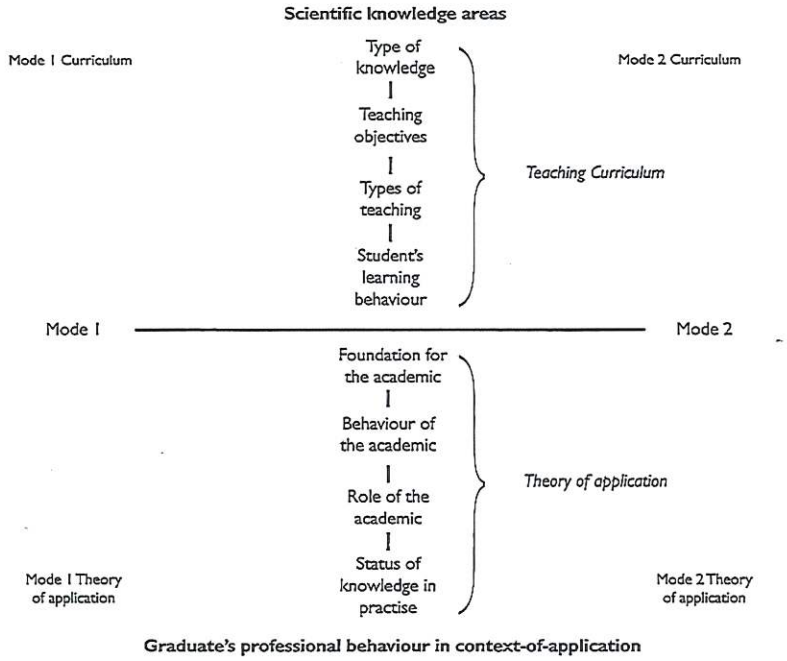

Figure 1: Linking Teaching Curriculum to Theory-of-Application.

The Vertical Dimension Depicted in Figure 1

On the vertical dimension, the upper part relates to what is going on during the programme of study, while the lower part is related to theories-of-application regarding the role expected to be fulfilled by the trained academic in his/her career following graduation. In developing a traditional research-based teaching curriculum, the focus is on the elements above the line – ranging from types of knowledge to students' learning behaviour. But, because of the challenges we have described, it is necessary to do this with an eye on the elements below the line – the roles that the trained academic has to fulfil after graduation. In short, on theory-of-application. Therefore, the vertical axis spans from "scientific knowledge areas" to "graduates professional behaviour in context-of-application".

Concentrating first on the upper part of the vertical dimension, scientific knowledge areas are linked to students' intended learning by the way in which the curriculum is designed. If the idea of alignment is followed (Biggs & Tang, 2007) this dimension starts by scoping the types of knowledge to be dealt with in a particular educational programme. This results in a set of teaching objectives, course descriptions, and the subjects to be addressed. When the teaching objectives are established, relevant types of teaching must be developed, based on impressions of student behaviour during the educational programme. In Figure 1 this is labelled "students' learning behaviour".

If we turn to theory-of-application – the zone below the horizontal, mirror axis – we can also differentiate between the different levels. For example: how knowledge relates to practice, which role the academic is expected to fulfil, and which academic competence this rests upon.

The vertical mirror axis thus provides a coherent linking mechanism between curriculum development and theory-of-application.

The Horizontal Dimension in Figure 1

Horizontally, the discussion spans different perceptions of knowledge production, as they can be seen as having different theories-of-application. This dimension is developed in response to the second challenge we have identified, namely; that the theory-of-application in traditional research-based teaching does not necessarily match the world as encountered by professionals.

Following the advice of Tynjäla *et al.* (2006) we propose more varied reflections on practice by distinguishing between two alternative theories-of-application built on the distinction between Mode 1 and Mode 2 knowledge (Gibbons, 1997; Gibbons *et al.*, 1994). To a large extent this debate concerns the university and the interaction of research with the surrounding society and is rooted in both university history and theory of science. However, if the concern shifts towards curriculum development and theory-of-application it will have massive consequences whether Mode 1 or Mode 2 is considered.

We unfold the typology by discussing the content of the two pairs of opposite dimensions: Vertically, by the play between scientific knowledge areas/curriculum development on one side and theory-of-application/competent professional on the other, and horizontally, between the two perspectives of knowledge production – Mode 1 and Mode 2.

By elaborating the content of the four quadrants in the framework, Figure 2 emerges:

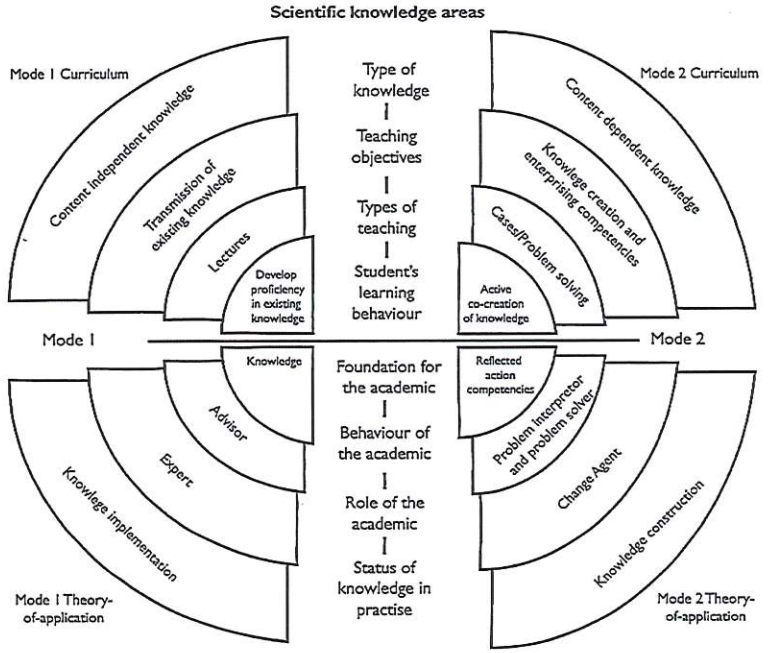

Figure 2: Specific Examples Linking Teaching Curriculum and Theory-of-Application.

Mode 1 curriculum. In the top left quadrant – in Mode 1 and concentrating on curriculum – the starting point is that research produces general knowledge that is independent of specific contexts. The objective of the teaching is to make students proficient regarding existing knowledge. This is typically done through lectures aiming at making the students learn facts through various kinds of learning behaviour.

Mode 1 theory-of-application. Looking at the bottom left quadrant – in the theory-of-application section – this is mirrored by the idea that context independent knowledge should be useful through implementation in specific contexts. Here the academic functions as an expert, based on academic skills applied in the role of advisor and on the fact that they have obtained a given knowledge base through their study.

Mode 2 theory-of-application. Here the idea is that academics entering the world of the professional practitioner need to be capable of constructing the knowledge necessary in a given situation. The role of the academic is no longer to be an expert, giving advice from a position outside ongoing processes but to be a change agent actively participating in processes in a manner that deals with problem identification, interpretation, analysis, and solution. The academics ought to be able to do so because their education has provided them with the necessary competences – which we label "reflected action competences" in Figure 2.

Looking at the top half of Figure 2, this Mode 2 theory-of-application must be supplemented with activities that animate the spectrum from scientific knowledge areas to student learning.

Mode 2 curriculum. Beginning at the top right quadrant of the figure our perspective is that knowledge depends on context. Thus, the teaching objective should be to teach enterprising students knowledge creation competences. This can be done through case and problem oriented types of teaching, for example, in which the students learn through active co-creation of context dependent knowledge – and this requires training.

Thus, in Mode 2 our argument is that it is not the knowledge content alone that gives the academic practitioner their foundation. The foundation also consists of the ability to work with knowledge construction principles and to act as a local change agent by having the action competences to intervene in the processes that unfold in specific contexts.

Application of the Framework

Our theoretical framework for curriculum development that balances rigour and relevance can inspire a clear-cut route beyond transmission. We will illustrate this by describing how two study programmes in our own department have used the framework to develop curricula capable of resolving the challenges we have identified. First, we review how competence-in-practice varies across different lines of study. Then, we present three ways of integrating theory and contexts of application into students learning by taking advantage of the distinction between teaching and learning curriculum.

Our department primarily focuses on offering programmes of study in the area of management and business administration. The two specific programmes of study to be discussed here are a Bachelor in Business Administration degree emphasising Entrepreneurship and Innovation and a Master of Science in Business Administration and Auditing. These lines of study present two extremes in relation to the application contexts to which the students are expected to contribute after graduation. Furthermore these differences mean that, typically, the students taking each programme tend to approach contexts of application in rather different ways.

One way in which to distinguish between different contexts of application is to distinguish between the degrees to which the environment is governed by technical and institutional controls (Scott, 1998). Technically strong environments allow the use of output controls to evaluate the quality of a given piece of professional delivery. In technically weaker environments it is more difficult to evaluate the quality of a given output. On the other hand, environments with strong institutional controls rely heavily on the degree to which a professional delivery is produced according to appropriate procedures.

		Institutional controls	
		Stronger	Weaker
Technical Controls	Stronger	*Auditing programme*	
	Weaker		*Entrepreneurship & innovation programme*

Figure 3: Examples of Programmes of Study Approaching Different Contexts of Application.

The Auditing programme and the Entrepreneurship & Innovation programme relate to different contexts of application, as reflected in Figure 3. Auditors are expected to work in an environment with strong technical and institutional controls. Graduates from Entrepreneurship & Innovation are expected to be able to contribute professionally to environments in which it is much more difficult to evaluate the quality of output of a given piece of professional work and in which the procedures for developing and evaluating professional work are much more ill-defined. Similarly, the nature of practitioners tasks in hand differ markedly in the two contexts. Therefore the competence-in-practice to be developed is significantly different.

In terms of our theoretical framework, the two programmes of study balance the knowledge production in Mode 1 and Mode 2 in different ways. The Auditing programme will have an emphasis on Mode 1 and the Entrepreneurship and Innovation programme will tend to tip towards Mode 2.

Our theoretical framework indicates why curriculum development must take the context of application into consideration in designing learning activities. We suggest three different ways of integrating the context of application into the learning activities.

Planned teacher-driven:

- This means that the developers of lines of study and specific courses develop an explicit theory-of-application and strive to design a teaching curriculum related to this theory-of-application. In this way, the course developers take responsibility for developing specific learning goals and take the opportunity to design an alignment between learning goals, forms of examination and specific learning activities. However, as with any theory the theory-of-application might be contested and the students on the course might not want to accept the proposed theory-of-application.

Planned student-driven:

- This approach is well suited to the study of entrepreneurship and innovation. As a planned part of the curriculum in this line of study, the students are obliged to work as an intern in a company concurrently with the formal study activities. The formal study activities are linked to the internship by integrating the project carried out in the company to the examinations in specific courses. Through this internship the students act as legitimate peripheral participants (Lave & Wenger, 1999) in the context of application. It is notable that, because of their firsthand experience with the context of application, the internship students very often confront formal teaching in much more critical ways than other students. This means that the internship students tend to develop their own personal learning objectives – or what Lave & Wenger (1999) term learning curriculum. As a consequence these students often have a more critical attitude and will challenge the teaching curriculum – that is, the way in which course designers intended to design alignment into specific courses. In this way, learning is beyond transmission-mode because the students are put into a situation in which they tend to develop their own learning objectives based on experience with the context-of-application.

Practitioner driven:

- This method is exemplified by our Master of Science in Business Administration and Auditing. Two-thirds of these students already have a career in an auditing company, concurrent with their studies, and the Masters degree is a prerequisite for further career advancement. In this case many students are highly aware of their personal learning goals and several teachers report difficulties in maintaining their students' interest in subjects which they perceive to have no immediate application.

To sum up, the relationship between the theory-of-application and the learning situation of the students at the university will shape how the curriculum development should be framed. In both programmes of study we have described, the theory-of-application is relevant for curriculum development even though the studies differ according to the technical and institutional control described in Figure 3. The Auditing programme is considered to encompass most of the Mode 1 knowledge production and elements of Mode 2 knowledge production. The Entrepreneurship and Innovation programme includes elements of both forms of knowledge production but with a more significant element of Mode 2 compared to the Auditing study. Consequently, both types of knowledge need to

be present and co-exist in Higher Education programmes. Furthermore, curriculum developers must focus on ways in which to make an explicit and deliberate use of these types of knowledge in developing studies and courses.

Conclusion

The literature about differences between research and practice tends to consider two gaps in isolation: one gap between research and teaching and another gap between teaching and practice.

In this chapter we have asked the question: how do we develop university curricula emphasising research-based teaching, where the students are seen as producers, in ways that make better practitioners?

This question challenges the literature on the research-practice gap by addressing both gaps together and emphasising research-based teaching for subsequent practice. The question led us to identify two challenges: how do we develop competence-in-practice in situations where the task in hand is not obvious?, and what are the implicit assumptions regarding application in practice within different academic disciplines?

In answer to the challenges we have suggested that we must be explicit about our theory-of-application. What is our theory about how the student is expected to be a better practitioner as a result of a given study programme? And how is this reflected in the curriculum design?

To broaden the debate in research-based teaching about how to develop "student-producers", we made a distinction between Mode 1 and Mode 2 knowledge production. This enabled us to produce a theoretical frame of reference suggesting that different forms of knowledge production have different theories of application and therefore demand different forms of teaching.

The Mode 1 approach is based on a hierarchical understanding of how knowledge is produced and has as an ambition to make students proficient in existing knowledge. This corresponds to a theory-of-application that positions the practitioner as an expert who can apply generalisable knowledge in specific contexts.

The Mode 2 approach differs in the sense that knowledge may be produced in many different places. It can be context independent knowledge as developed in universities and it can be context specific knowledge

in particular contexts-of-application where solutions to messy problems call for problem definition skills crossing traditional disciplinary boundaries. Mode 2 knowledge production is mirrored by a theory-of-application where the practitioner is expected to be able to construct knowledge and to act as a change agent in situations where problems are not easily defined in ways that can be handled through existing methods and procedures.

Although the specific competences to be practiced for Mode 1 and Mode 2 knowledge production differ significantly, both approaches call for teaching methods that go beyond transmission.

Schön suggests that rigour and relevance represent a dilemma for the practitioner. These two aspects of knowledge do not only exist as two separate worlds for students – teachers also often regard them as mutually exclusive. However, we do not find that this is a productive separation to be made in developing university curricula in which the bulk of students are not expected to enter a research career.

By explicating different relationships between scientific knowledge areas and graduates' professional behaviour, we describe two types of knowledge production underpinning the relationship between theory and practice. Both types must co-exist in university curricula and our framework shows that they can be supplementary to one another rather than opposites.

We conclude that the balance between the different forms of knowledge production should be developed with an eye fixed on what is expected of practitioners in the context of application, to which today's students will be expected to contribute in their subsequent practice.

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