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PhD pedagogy and the changing knowledge landscapes of universities.

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PhD pedagogy and the changing knowledge landscapes of universities.

Abstract

PhD supervision is increasingly embedded in frameworks that link research to issues of knowledge transfer involving the translation of knowledge to domains outside the university where it can be taken up and applied. This tends to require research that goes beyond traditional disciplinary boundaries and raises questions of the nature of knowledge relationships required in this context. This paper draws on the work of Basil Bernstein to identify the organisational, knowledge and interpersonal relationships that these changes now require, describing the nature of the work involved in weakening boundaries between disciplines and its implications for supervisor student relationships. The paper then outlines the challenges this presents to universities, with specific reference to the humanities and social sciences, attempting to implement strategic programs reconciling pedagogic requirements with the quality, impact and completions they must attest to in order to secure public funding.

Keywords: Bernstein; Interdisciplinarity, Pedagogy; PhD supervision; Scholarship of Integration

Introduction

In the context of intensified strategies to accredit and professionalise postgraduate supervision in the academic field, there is an attendant increasing requirement for supervisors to be strategic, reflective and to prioritise timely completions. Further, recent policy emphases on the knowledge economy and innovation have subtly introduced new and additional emphases and values into the higher degree research process. They have linked research, including higher degree research, to broader goals of knowledge transfer involving the translation of knowledge to domains outside the university where it can be taken up and applied. Policy shaping the National Research Priorities, in Australia, for example, is linking these priorities to increases in research and development investment in these areas.

In the Australian context, it has been acknowledged for some time that tying research more directly to innovation outcomes introduces increased requirements for multidisciplinary and interdisciplinary emphases in higher education (Manathunga *et al*, 2006). Grigg *et al* describe that rationale as follows:

The current attention directed at cross-disciplinary research arises from a widespread recognition that important societal questions can no longer be adequately addressed within a single discipline, and, in fact, demand multidisciplinary and interdisciplinary conceptualisation and subsequent research solutions.... In addition, it is quite clear from a cursory examination of advances in many fields such as the life sciences, that it is the activity at the interfaces of disciplines that is of crucial importance to these advances (Grigg, *et al*, 2003: 1).

In both the European and Australian case, with reference to the sciences, a key recommendation to address this issue is that research training provides for greater mobility and time so that students can be rotated across different

research laboratories to learn new research approaches and techniques. (LERU, 2007:2; Grigg, Johnston, and Milsom, 2003: 54). More recently, in both Australia and Europe, it has been suggested that these principles of interdisciplinarity should be extended to include the social sciences and humanities:

It is becoming increasingly necessary to draw on knowledge from many disciplines in meeting the challenges and opportunities of the modern economy and society. Scientific or technological research, in particular, benefits from the inclusion of complementary work in the social sciences and humanities. We need to think about ways the practice of *interdisciplinary* research can be encouraged and facilitated (Howard, 2008).

Howard acknowledges that current impediments to the application of these principles exist in structures and traditions in universities, and also observes that a robust “scholarship of integration” is required, involving a commitment on the part of both providers and users of research. (Howard, 2008: 26). In the context of universities, Candy has described this principle espoused by Boyer as crucial in synthesising insights from different knowledge domains and in providing a platform for application. He identifies three key dimensions of integration as implicated in the concept: 1) integration within a discipline or field, 2) incorporation of new knowledge acquired in real world settings and 3) drawing together insights from different disciplines or fields of study (Candy, 2000). This paper argues that universities’ capacity to enable and encourage integration in higher degree research which is inclusive of the social sciences and humanities can be enhanced through a systematic analysis of the pedagogic relationships at stake in this context.

The paper examines the nature of the changing knowledge landscapes within universities and between universities and their communities that form the context in which interdisciplinarity in research higher degrees is conducted, and the nature of the learning relationships required for postgraduate research in this context. First I review recent work in the scholarship of postgraduate supervision as a means of setting up the question of university knowledge landscapes as a key focus in an analysis of these relationships as pedagogy. I then outline the conceptual framework of Basil Bernstein as a set of “thinking tools” in order to describe the changes in education that form a backdrop to our current concerns with the nature of this pedagogy and the principles which might guide its operationalisation. The paper then turns to an application of this framework to the particular case of research supervision, referring to examples from the humanities, arts and social sciences, and using Bernstein’s analytical framework to describe the organisational, knowledge and interpersonal relationships that broader educational changes now require in this context. The paper then outlines the challenges this presents to universities currently attempting to implement strategic programs reconciling pedagogic requirements with the timely completions they must attest to in order to secure public funding.

Background: the scholarship of higher degree research pedagogy

Research concerned with effectiveness and quality in doctoral supervision over the last ten years is responding to some key issues and dilemmas experienced in a changing climate of postgraduate supervision. Aspland et al (1999), for example, addressed the convergence of trends for postgraduates to constitute an increasing proportion of universities' enrolments, with a more proactive and strategic approach to timely completions, and documented levels of student dissatisfaction. Their paper advocated an evaluation strategy that focuses on the quality of the supervisor student relationship. The evaluation framework rests on empirical evidence that many concerns regarding postgraduate supervision pertained to a mismatch in expectations between supervisors and students regarding respective responsibilities. Evaluation instruments are then focused on strategies for reflection on supervisor/student relationships, and on sharing and communicating on experiences regularly in order to identify and address areas of concern before they become problematic. In this respect, this research is oriented to the development and maintenance of supervisory relationships that are sufficiently responsive and flexible to deal with increased numbers and diversity in postgraduate students.

In line with this agenda, there are a growing number of studies that research and document various aspects of the student supervisor relationship in the interests of better quality, completion rates and student satisfaction. At a generic level the studies suggest frameworks for supervisory practice and evaluation that include appropriate relationships, management, flexibility, peer and university support, intellectual engagement, and teaching aspects including the use of theory and concepts, research questions, methodology, assessment, project design, publications, literature reviews and thesis writing (Wisker, 2005; Zuber-Skerrit & Ryan, 1994; Zuber-Skerritt, 1996).

The focus on strategies that are seen to be instrumental in the achievement of effectiveness and quality in supervision has been accompanied by a move to address these questions using a conceptual and analytical focus on supervision as pedagogy. Green and Lee embrace the notion of pedagogy as a means of providing a coherent framework within which to understand the system of relationships in which postgraduate supervision and learning is embedded. A key characteristic of this conceptual approach is its focus on the relationship between learning contexts and the knowledge process (Green & Lee, 1995). For example, the focus on postgraduate supervision as pedagogy enables the systematic inclusion of current tendencies for knowledge processes to move beyond strict boundaries of disciplines, and across divisions between research and teaching, and traditional roles of lecturer/student (Green & Lee, 1995; McWilliam and Palmer, 1995; Hodge, 1995). The framework developed by the sociologist, Basil Bernstein is oriented to understanding the principles producing changes such as these as they pertain to the substantive content of higher degree research projects as well as the relationships that underpin communication around them. There has been substantial examination of Bernstein's insights at a theoretical level and also empirical studies of school and higher education pedagogy in the context of coursework. However, there are much fewer studies examining the links between the knowledge requirements of universities and their implications for experiences of doctoral

students and supervisory processes in an interdisciplinary context. This paper now turns to an outline of the key analytical principles proposed by Bernstein to assist in understanding these relationships.

Bernstein's analysis of changing pedagogic relationships

A crucial dynamic influencing the nature and form of pedagogic agencies, discourses and practices in higher education for Bernstein is the process of regionalisation: the strategic bringing together of disciplines that may previously have existed as singulars. The development of knowledge in the nineteenth century involved the birth and development of disciplinary domains that were characterised by unique names such as physics, chemistry and sociology. Their singularity and uniqueness were underpinned by their tendency to have very few external references, producing discourses that were only about themselves. The twentieth century marked a tendency towards the regionalisation of knowledge, bringing together singulars through the emergence of "recontextualising principles". Domains such as medicine, engineering, information science, and, more recently, creative industries, have been established as regions in universities, exercising a level of autonomy that enables responsiveness to the markets for their outputs. These changes are also underpinned by a requirement to develop principles concerning "which singulars are to be selected" in a given region and "what knowledge within the singular is to be introduced and related" (Bernstein, 2000: 9).

Regionalisation, recontextualisation and classification

The grouping of singulars within regions tends to require a weakening of the traditional boundaries between them. These relations between categories Bernstein calls classification:

I am going to use the concept of classification to examine relations between categories, whether these categories are between agencies, between agents, between discourses, between practices (Bernstein, 2000: 6).

The process of regionalisation is attended by (re)contextualising discourses that provide a rationale for regions' identities and the co-existence of what have been seen as singulars within the domain of the region. The development of these discourses opens up questions around the previously strong classifications between the disciplines: relationships which reside at the level of institutional agents, discourses, and at the level of everyday practice. Weakening classifications are also occurring between universities and organisations, stakeholders and communities outside of the university domain. The regionalisation of knowledge in line with 'markets' for engineering, medicine etc, also required a weakening of boundaries between the university and domains of professional practice. Further, in their quest for greater funding support, social, political and symbolic alliances, "university community engagement" has recently become a discourse about recontextualising and rendering more permeable the relationships between the university and stakeholder bodies (DeLaforce et al, 2005). It follows, then, that the nature of the recontextualising discourses are a key to the way in which the relationships raised by weakening classifications are understood and

negotiated. These relationships have been documented with respect to postgraduate pedagogy in the context of coursework by Singh et al where they have analysed the strategies and identities implicated in managing the tensions between markets and disciplinary knowledge. In formulating an application of Bernstein's framework to this specific nexus they observe that:

This pedagogic position is Janus-faced – with one face always looking outwards to market and state regulatory forces, and the other face looking inwards to the introspective demands of disciplinary knowledge (Singh and Knight, 2005).

The institutional response to the requirement for recontextualisation influences the 'what' and 'how' of pedagogy. However, recontextualising discourses are not reducible to any specific singular or disciplinary set of principles. Bernstein provides an example of physics as a means of distinguishing disciplinary discourse and principles from a recontextualising pedagogic discourse:

As physics is appropriated by the recontextualising agents, the results cannot formally be derived from the logic of that discourse. Irrespective of the intrinsic logic which constitutes the specialised discourse and activities called physics, the recontextualising agents will select from the totality of practices which is called physics in the field of the production of physics. There is selection (Bernstein, 2000: 34).

Clearly the processes of selection are a key point at which classifications between singulars, and between the academy and domains of practice, are reconfigured, and are guided by the specific discourses and principles universities develop around regionalisation processes. In the context of regionalisation that characterises higher education, particularly in the case of newer universities that are more heavily dependent on generating new markets, this discourse is influenced by the need to project an identity that appeals to these markets. This projection is also manifested in recontextualising principles where the interface between external and internal relationships must be managed. Increasingly, these principles are also infused with the requirement to account to the state for funding purposes. Here, it is arguable that contemporary universities introduce a level of predominantly regulative and administrative rationales and guidelines and provide an institutional level framework of accountability to students and other stakeholders. The standardisation of processes associated with the administration of course delivery at both undergraduate and postgraduate levels is a case in point. However, as Beck and Young point out, Bernstein's account of regionalisation serves more to identify and raise questions about these processes than to provide a nuanced analytical schema for capturing integrative processes (Beck and Young, 2005). The issue of identifying these processes as they apply to postgraduate pedagogy requires further research.

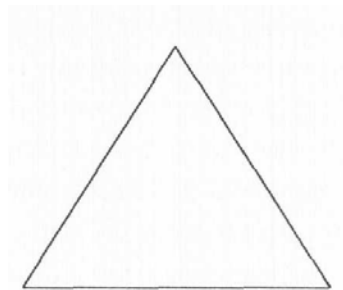
A further key context in which selection occurs in moves to interdisciplinary higher degree research is the changing knowledge structures and pedagogic relationships required to accommodate weakening classifications between disciplines. This has been characterised by Bernstein with reference to his

distinction between horizontal and vertical knowledge structures. Strongly classified singular disciplines are characterised by segmented horizontal knowledge structures, described by Bernstein as follows:

Horizontal knowledge structures consist of a series of specialised languages with specialised modes of interrogation and criteria for the construction and circulation of texts.Thus, in the case of English literature, the languages would be the specialised languages of criticism; in Philosophy, the various languages of this mode of inquiry; and in Sociology....the languages refer, for example, to functionalism, post-structuralism, post-modernism, Marxism, etc. (Bernstein, 1999: 162).

While disciplines may be presented in this way, particularly at undergraduate level, the process of regionalisation highlights the extent to which pedagogy is a process of selecting aspects of disciplinary knowledge to be conveyed and the way in which that knowledge is described. The logic of regionalisation, driven at least in part by relationships with specific markets, not just of potential students, but also of research funding, requires an approach to pedagogy that enables postgraduate students to make knowledge contributions and discoveries that have the potential to be recognised in these markets. For Bernstein, this requires a movement from horizontal to vertical knowledge structures capable of assimilating and integrating new discourses, approaches and applications. The key distinguishing feature of vertical knowledge structures is that they are hierarchically organised, illustrated by Bernstein as a triangle as follows:

Figure 1: Hierarchical Knowledge Structure (Bernstein, 2000: 161).



For Bernstein the central organising principle of this knowledge is integrative:

This form of knowledge attempts to create very general propositions and theories, which integrate knowledge at lower levels, and in this way shows underlying uniformities across an expanding range of apparently different phenomena. Hierarchical knowledge structures appear by their users to be motivated towards greater and greater integrating propositions, operating at more and more abstract levels. Thus it could be said that Hierarchical Knowledge Structures are produced by an integrating code. (Bernstein, 2000: 161).

The analytical distinction achieved through the concepts of horizontal and vertical knowledge structures enables us to identify the shift that is required when reconciling propositions developed in the context of doctoral research

across discrete disciplines, such as design and sociology. Specific language and principles are required to integrate insights (patterns identified and inferences derived) from originally highly segmented knowledge domains.

This framework has provided for a focus on the context in which the nature of pedagogic relationships is shaped and operationalised by specific social processes. The tendency to regionalisation and thus weakening classifications between disciplines has both provided a context for, and opened up, recontextualising issues: Issues of the nature of official standards, metrics and processes at both government and university level; and the specific kinds of pedagogic interpretation and selection required in response to the need to move to vertical knowledge structures to address the disciplinary integration entailed in the development of regions. As Bernstein has further observed, these processes have implications at the level of agents, discourses and practices. The move to weakening classifications has sociocultural implications for the relationships between staff and between staff and students. In a system that relies heavily on identification with singulars, the identifications of staff and students are consistent with the organisational structure that delineates and distinguishes them, providing psychic systems of defence in individuals. However, when the boundaries are weakened in the interests of regionalisation, coherence must increasingly be established around knowledge itself (Bernstein, 2000: 11-12). This suggests that different forms of social ordering may follow changing relationships between agents, discourses and practices.

Framing

The form of social ordering is a crucial element in pedagogic relationships. Bernstein refers to this aspect of pedagogic practice as framing: “the controls on communications in local interactional pedagogic relations”. If classification refers to the *what* of knowledge relationships, then framing “is concerned with *how* meanings are to be put together, the forms by which they are to be made public, and the nature of the social relationships that go with it” (Bernstein, 2000: 12). Thus while classification points to the form and nature of relationships that form the *context* of pedagogic practice, framing focuses attention on the *internal logic* of this practice. For Bernstein, framing refers to the nature of the control over:

- The selection of the communication;
- Its sequencing (what comes first, what comes second);
- Its pacing (the rate of expected acquisition);
- The criteria; and
- The control over the social base which makes this transmission possible.

Strong framing occurs where there is explicit control over the above processes. Weak framing means that the student has more apparent control over them. The level of framing across the above processes can vary. For example, it is possible to have strong framing around the pacing of the

pedagogic process, but weaker framing around the social base of the pedagogic communication (Bernstein, 2000: 12-13). Framing has two distinct dimensions: those aspects of pedagogic relationships that are primarily concerned with the regulation of the relationship (regulative discourse): expectations around conduct, character and manner; and those associated with the nature of the instruction (instructional discourse), referring to selection, sequence, pacing and criteria of the knowledge (Bernstein, 2000: 13).

This distinction between the instructional and the regulative aspects of framing is central to our understanding of contemporary pedagogic relationships. The instructional discourse, specifically the selection of communication, is clearly occurring in an environment of weakening classification between singulars and in the context of processes of regionalisation. This sets up (consciously or unconsciously) specific rules for students' learning processes. These, in turn, may be seen to require a particular kind of regulative response. This raises the question of the nature of these relationships that are required in environments that no longer pre-define and specify pedagogic processes and identities.

Classification and framing in interdisciplinary research higher degree pedagogy in the Humanities and Social Sciences.

The emphasis on integration has crucial implications for the pedagogy of postgraduate supervision aimed at advances requiring moves outside traditional boundaries. In applying Bernstein's framework to an analysis of key issues and processes in doctoral supervision in the humanities and social sciences, it becomes clear that moves to interdisciplinarity and integration increase and render more complex, issues of pedagogic selection faced by supervisors. It is arguable that these changes and requirements are experienced with particular intensity in the humanities and social sciences where supervision has traditionally focused on a "complex three way transaction between teacher, text and student", a relationship which can be "transformational, but also dialogical and "messy" (Grant, 2008: 12). This stands in contrast to traditional characterisations of supervision in the sciences that frequently involves students' membership of a supervisory team and peer group all of whom are familiar with aspects of the students' work as part of a common research program (Neumann, 2007: 464).

At the level of form and content of the knowledge produced in postgraduates' work, the supervisor, whose intellectual roots are frequently based in a singular domain characterised by horizontal knowledge structures, must acquire principles that enable them to understand the students' research problems in terms of a vertical or hierarchical knowledge structure. For example, a student may wish to contribute to insights in the domain of social aspects of urban design. The supervisor, who may be a sociologist, must find a means of integrating insights from sociology with its own nuanced conceptual language, with discourses from design associated with user centred design principles, at a level that is sufficient to guide the student through the processes of integration and recontextualisation. Thus vertical knowledge structures need to be employed by both supervisor and student to address the

weakening classifications between sociology and design. Further, however, the hidden aspect of pedagogy here is that the supervisor must have a sufficient understanding at a generic level of what is required for the development of knowledge through integration to provide the student with the tools to accomplish this with respect to their own specific topic area. This is an area that receives very little attention in any of the discourses or literature around what is required of supervisors, and is a key area for further research on postgraduate pedagogy.

Another crucial consideration in higher degree research learning at the interface between social sciences and humanities on the one hand and the “harder” scientific and technical disciplines on the other is traditional differences in culture and emphases on inductive, discovery oriented processes and deductive, theory testing approaches. These differences are seen to have implications for the way a research topic is identified and developed: “In the humanities the expectation has been for students to identify a general topic area and in the course of their doctorate to refine it, turning it into a thesis.” This process has been characterised as ‘refinement by induction’ (Neumann, 2007: 463). This observation points to the possibility that the integration at stake potentially needs to occur not only at the substantive level but also in the logics and rationales of inquiry itself. Indeed, Neumann has observed that while the sciences have been seen as embracing a more prescriptive approach to the development of topic and research processes, recent research reveals that this is not universal and points to experiences of a less certain evolution of research topic and processes (Neumann, 2007: 464).

Such changes in the form and content of knowledge in the context of weakening classifications have critical implications for the logic and processes of postgraduate pedagogy: its framing. As outlined in the previous section, Bernstein’s concept of framing covers two aspects of pedagogical processes encompassing both instructional (selection, sequence, pacing and criteria of knowledge) and regulative (conduct character and manner of communication) elements. In applying the concept of framing to the domain of postgraduate pedagogy, Parry, Atkinson and Delamont (1994) have drawn particular attention to issues of disciplinary identity as a central aspect of the character of communication around doctoral work. Their analysis clearly illustrates the impact of regionalisation and weakening classifications on the experience of doctoral work and the relationships which form around it. They found that the more doctoral work was neatly identified with a disciplinary tradition, framing was strongest, and, conversely, “where doctoral work was presented in terms of the overriding research problem or topic, then framing was at its weakest (Parry, Atkinson and Delamont, 1994: 41). The link between the form and content of knowledge and the relationships that form around that knowledge, then, turns on the greater level of flexibility and fluidity required for research that is oriented to using whatever knowledge resources are required to address a particular research problem. The relationships must take their cue from the nature of the knowledge required rather than those prescribed through strong disciplinary identities.

This requirement for weaker framing is quite possibly the context in which researchers have been drawn to the question of supervisory relationships. Green seeks to contribute to a framework for understanding and operationalising supervision pedagogy that emphasises the role of symbolic elements in the production of the notions of supervisor and doctoral student. He illustrates the role of fantasy, identifications, and communities of practice in the construction of a delimited array of supervisor-student subject positions (Green, 2005). The work of Bartlett and Mercer is consistent with this, arguing for the adoption of metaphors that might assist in guiding the thesis through various stages, which permit an inclusive and flexible pedagogic relationship around research supervision (Bartlett and Mercer, 2000). However, while these studies draw attention to the nature and importance of the communication/conduct aspects of framing, there is less emphasis in the literature on knowledge selection and criteria involved in instructional aspects of framing and how communication/conduct relationships may be driven by them. Here it is critical to acknowledge that doctoral work oriented to discovery research across traditional boundaries is not simply being conducted in the *context* of regionalisation and weakening classifications, the focus on innovation requires that weakening classification is a *key aspect of the work itself*. It is part of the groundwork needed to enable new advances. The supervisor's role in guiding the selection of knowledge in this case involves an understanding of the strategies required for knowledge integration, modelling for students the processes through which concepts and research approaches across disciplinary boundaries can be understood as commensurate.

This identification of the knowledge implications of weakening classifications and moves from horizontal to vertical knowledge structures at the instructional level assists in understanding the nature of the relationships at stake at the regulative level through the evolution of a postgraduate research project. Given the tendency for students to develop research problems that are salient for them, the state of knowledge in their field, and markets and audiences for their work, rather than prescribed by disciplinary interests, the regulative aspects of pedagogy must involve the reaching of a level of mutual understanding between supervisor and student of key ontological aspects of the student's topical focus. This has been illustrated by Vella in his analysis of doctoral work in music, where students' awareness of their practice is a critical precursor to their capacity to 'name' their doctoral focus as a research question (Vella, 2005). These insights could be argued to be just as true for many domains of the humanities and the social sciences. Here students' commitments to a research focus often bear traces of their own experiences, practices and motivations. These are key reference points in their orientation to generate new knowledge that can be taken up and used in fields of activity. Turning these experiences and practices into objects of inquiry is thus a key phase with its own requirements for timing and pacing but also demands a significant level of understanding between supervisor and student of the nature of the journey the student must make from ontology to epistemology.

The subsequent move from a "named" topical focus to all the issues which flow from it in formulating points of departure, conceptual frameworks,

research strategies and designs again require intensive work between supervisor and student. Given their approach to the topical focus of their work, they face the problem that the means to address the problem rarely lies in one disciplinary domain. The project can appear open ended and unmanageable because of the different disciplinary discourses, emphases and cultures that they must come to understand for integration to occur. Thus while the term “literature review” is used at the level of universities to describe generically a phase of postgraduate research, the complex and difficult processes this may involve receives far less attention. The review is much more than a list of recent work. Ultimately it involves the discussion of extant work in the topic area from the standpoint of an integrated or vertical knowledge structure that is not reducible to any of the disciplines they may be working in. At an instructional level, supervisors need to be able to help the student understand the task of the literature review in this way, and also how to manage the application of a vertical knowledge structure in the service of addressing the weakening boundaries between disciplines, sometimes for the first time. At this point there is also pressure to manage this task in terms of other instructional requirements of timing and pacing of work. Students frequently fear that these tasks could take far longer than the time available. Part of the instructional requirements for supervisors in this context is the capacity to make judgements about the difficulty and scope of the work and assist the student to delineate the topical focus in order to address the requirements for timely completions. Thus a consideration of the “literature review” illustrates the way all the pedagogic ingredients required at the instructional level for the development of new knowledge across traditional boundaries are intensified in the supervisor student relationship.

The issues that emanate from the instructional level of framing have important implications for the nature of the supervisor/student relationship at the regulative level. The relationship must be responsive to the knowledge requirements illustrated above with reference to “the literature review”. Students need to be able to ‘trust’ their supervisor to understand the nature of the journey involved in work across disciplines, to help them make judgements about the scope, difficulty and timing of their work. When faced with these issues, students can often feel insecure about the project and, at these points demand a significant amount of reassurance and support. In one sense the flexibility needed to support these aspects of the relationships are understood in terms of Bernstein’s framework as weak framing. However this can disguise the tendency for this flexibility to constitute a new and demanding form of social ordering required in supporting discovery-oriented projects across disciplines. These requirements are clearly an important element in the observations by Yeatman (1995) and Johnson, Lee and Green (2000), that the enlightenment image of the autonomous and independent scholar is currently experienced as deeply problematic. The nature of the social ordering needed to respond to changing knowledge requirements needs further investigation, particularly in terms of its link to the demands of research that is cognisant of its place in processes of knowledge transfer.

Conclusion

This analysis of postgraduate supervision as pedagogy points to questions around the resources required for universities to deliver outcomes appropriate for policy environments emphasising knowledge transfer. The process of regionalisation, driven by universities' alignment of research and teaching with new and changing markets has presented significant challenges at the level of postgraduate pedagogy. The application of Bernstein's framework to this issue has enabled an identification of the form and content of relationships required by this process that have remained largely invisible at a program and policy level and inadequately represented in evaluation frameworks. It is important that we build upon the research in the scholarship of postgraduate supervision that has identified key elements at stake in contemporary doctoral work, in order to understand these elements in a system of relationships that are shaped by the regionalising knowledge landscapes of universities. For example, in examining what is required in these relationships to support activities such as literature review, research design, time management and so on it is important that these are understood in the context of moves from horizontal to vertical knowledge structures, and of changing and intensifying relationships required to enable learning in this context.

In the context of the knowledge requirements of doctoral work across disciplines, it is critical that we examine what the emphasis on timely completions means for resourcing these projects. For many students, the location of their research in a vertical knowledge structure that is able to incorporate new insights and discourses across disciplines is time consuming. In order for students to keep to timelines, there is a requirement for intensive support at both the instructional and regulative level of the student supervisor relationship. Further, in the context of doctoral work across disciplines, students require significant support in translating their work into outcomes of "quality" understood in terms of peer reviewed publications. Universities and scholarly journals are still strongly imbued with the cultures of singular disciplines and horizontal knowledge structures, evidenced by universities' own rankings of 'quality' journals. Finding appropriate contexts for peer review and assisting the student to persist in submitting work when sometimes the cross-disciplinary work is not immediately received or understood is an added element in the supervisory relationship. The student embarking on new work across disciplines is the one who is most likely to produce work that has 'impact': that has the potential to be translated into uses in fields outside of academic life. In the context of pressure of time and resources in doctoral work, it is critical to research and identify the instructional and regulative relationships that can assist in supporting the difficult work of doctoral research oriented to discoveries beyond the boundaries of traditional disciplines and structures.

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Figure 1: Hierarchical Knowledge Structures (Bernstein, 2000:161)

