The Built Environment Interdiscipline: A Theoretical Model for Decision Makers in Research and Teaching

Paul Chynoweth: *University of Salford, UK*

Abstract

Purpose - The built environment subject area is now well-established as a recognised field of study. However, because of its vocational orientation it is usually defined in terms of a particular range of professional activities and aptitudes. In consequence the theoretical nature of its academic knowledge base is poorly developed. This has consequences for research and teaching practice within the field which are explored in this paper.

Approach - Using established literature on the historical approaches to knowledge categorisation a theoretical model is proposed.

Findings - The proposed model defines the built environment as an applied, but theoretically coherent, interdiscipline with a common epistemological axiomatic.

Originality/value – The paper proposes a new model of the built environment knowledge base for further discussion within the field. The practical benefits of the model are also illustrated by examples in the context of curriculum design, research strategy and the research-teaching nexus.

Keywords - epistemology, interdisciplinarity, research, teaching, theory.

Paper type – conceptual paper.

The built environment subject area is now well-established as a recognised field of study. However, because of its vocational orientation it is usually defined in terms of a particular range of *professional* activities and aptitudes. In consequence the theoretical nature of its *academic* knowledge base is poorly developed. This has consequences for research and teaching practice within the field. Using established literature on the historical approaches to knowledge categorisation a theoretical model is proposed. This defines the built environment as an applied, but theoretically coherent, *interdiscipline* with a common epistemological *axiomatic*. The practical benefits of the model are illustrated by examples in the context of curriculum design, research strategy and the research-teaching nexus.

Keywords: built environment, education, epistemology, interdisciplinarity, research, teaching, theory.

Introduction

The built environment subject area is now established as a recognised field of study by the international academic community. However, its identity has traditionally been defined in terms of the traditional construction and property professions from which it has emerged, and more recently, by the cultural and behavioural aspects of its international research activities.

Although there is broad acceptance that the field is *multidisciplinary*, there has been little attempt to define the cognitive nature of its particular knowledge base, nor to consider the implications of this for research and teaching practice. Studies of the field are few in number (for example, Temple 2004) and tend to be characterised by a pragmatic and issue-driven approach to the subject, with little attempt to understand its underlying academic base. This may reflect a more general suspicion of the value of theory within the field (Koskela 2008).

When cognitive issues have been discussed, they have tended to be addressed in a piecemeal fashion, for example in the isolated contexts of construction management (Loosemore 1997), surveying (Walker 2001), architecture (Penn 2008) or real estate (Diaz 1993). Works of this nature have also largely drawn on the personal experiences of the authors, and on literature published by other built environment writers, rather than on established academic sources.

By neglecting the established literature on disciplinary characteristics these studies have missed the opportunity to develop a consensus within a recognised theoretical framework. This lack of a recognised theoretical disciplinary base for the built environment subject area is well recognised (Betts & Lansley 1993, Loosemore 1997, Brandon 2002) and has inhibited decision making in both the research and teaching arenas. The current paper explores these issues in the context of the historical and theoretical approaches to knowledge categorisation. Based on these approaches it proposes a model of the built environment as an applied, but theoretically coherent, *interdiscipline* and demonstrates how this can be used to aid decision making in particular areas.

The Categorisation of Knowledge

Human society has found it necessary to categorise the various forms of knowledge since at least the times of Ancient Greece in order to render the world intelligible. Although, over time, these categorisations have taken a number of different forms three major themes emerge which contribute to modern views about the nature of academic knowledge.

The unity & disciplines of knowledge

The first of these is the notion that, although knowledge may be categorised according to disciplines, it nevertheless maintains a unity which transcends any divisions so created. This was first articulated by Plato (ed. Waterfield 2003). Aristotle later developed the concept into a hierarchy of subject areas with Philosophy, a higher, universal and undisciplined field of knowledge, binding all other fields together (trans. Lawson-Tancred 1998; Rowe 2002).

This idea of the unity of knowledge survived the progressive emergence of organised disciplines within universities from the late Middle Ages onwards. It is evident, for example, in Descartes' analogy of philosophy as a tree with the disciplines making up its roots, trunk and branches (trans. Sutcliffe 2001) and also in Kant's concept of an *architectonic* of the structure of all knowledge (trans. Meredith 1978). It is, of course, also preserved today in the name of the Doctor of Philosophy (PhD) degree which is awarded for research in any area of knowledge.

Pure and applied knowledge

The second major theme concerns the idea that knowledge can naturally be categorised as either pure or applied. Pure knowledge is based entirely on theory whilst applied knowledge involves the application of theoretical knowledge in a particular practical context. Aristotle identified three classes of disciplines. Although he described an intermediate class which was concerned with ethical issues, his main distinction was between the *theoretical* and what he referred to as the *productive* disciplines. The theoretical class included mathematics and the natural sciences whilst engineering was an example of a productive discipline (trans. Lawson-Tancred 1998; Rowe 2002).

The idea of pure and applied disciplines is a familiar one and Boyer (1990) has recently described it in terms of the scholarship of discovery as opposed to the scholarship of application. The distinction echoes the philosophical distinction between propositional (or factual) knowledge and practical knowledge of how to do something (Audi 1999).

The two cultures

The final theme concerns the distinction between the sciences on the one hand and the arts and humanities (often jointly referred to simply as the arts) on the other. Until the end of the eighteenth century the term "science" was used interchangeably with "philosophy" to refer to scholarship in all branches of knowledge.

This changed from the early nineteenth century when the description became restricted to the natural sciences which by that time had become concerned with the investigation of external phenomena through empirical methods. The success of the natural sciences enhanced their credibility and this, in turn, influenced the development of the social sciences which also later chose to adopt empirical methods.

Due to the greater unpredictability of the social world, there were inevitably differences between the methods adopted in the natural and social sciences. Nevertheless, a far wider gulf started to emerge between these sciences collectively, and the remaining disciplines in the arts and humanities which continued to follow traditional patterns of scholarship.

By 1959 this gulf had been given popular expression by CP Snow in his now infamous Cambridge Rede lecture, *The Two Cultures and the Scientific Revolution* (Snow 1959). The resulting media publicity ensured that the arts / science divide passed into the popular culture and, no doubt partly for this reason, it has continued to play a dominant role in disciplinary categorisation to the present day.

Disciplinary Models

Each of these three themes is reflected in the various conceptual models which have been developed since the 1960s to explain the nature of disciplinary differences. Within these models the unity of knowledge and pure / applied themes are generally dealt with implicitly and most attention is focused on what this paper has described as the arts / science distinction.

In fact most of the models develop their ideas under this theme from Kuhn's (1962) *The Structure of Scientific Revolutions*. In this seminal work Kuhn argued that science proceeds, not through a process of incremental development, but by periods of uneventful "normal science" interspersed by periods of rapid change (or "paradigm shifts") following a crisis in the prevailing epistemological and methodological paradigm.

Within his thesis he noted that different academic disciplines are characterised, to varying degrees, by the presence of paradigms that prescribe the appropriate problems of study and the validity of methodologies to be employed. Whilst some fields (typically the natural sciences) are characterised by highly developed paradigms, others (for example the humanities) are less so and research within these disciplines therefore tends to be more idiosyncratic.

Lodahl and Gordon (1972) used Kuhn's thesis to develop the so-called "paradigm development" model whereby variations in academic disciplines could be measured according to their position along a scale of paradigm development. The results of their study into university departments in the physics, chemistry, sociology and political science disciplines appeared to support the validity of the model and this has subsequently been used by others in a number of other studies (Braxton and Hargens 1996).

The most widely used model is however that developed by Biglan (1973). This also draws on the concept of paradigm development which it uses to place disciplines on a continuum from "hard" (paradigmatic) to "soft" (non-paradigmatic). The model also explicitly incorporates the pure / applied theme which enables it to identify any discipline on a hard-soft / pure-applied matrix. Based on Biglan's empirical findings the position of individual academic disciplines can be plotted on the matrix as illustrated in Figure 1.

It will be seen that the natural sciences fall into the bottom left (hard-pure) quadrant whilst the arts and humanities are to be found in the bottom right (soft-pure) part of the matrix. In fact, there is a continuum from the natural sciences on the far left hand side of the diagram, through the social sciences in the centre, to the humanities and finally to the arts on the far right hand side. This transition reflects the progressive relaxation of paradigmatic requirements and the increasing level of personal input by the individual scholar into the academic enterprise. The matrix is completed by the inclusion of the applied axis. The applied sciences, which serve the engineering professions, appear in the top left (hard-applied) sector whilst the social and creative professions are found in the top right (soft-applied) quadrant.

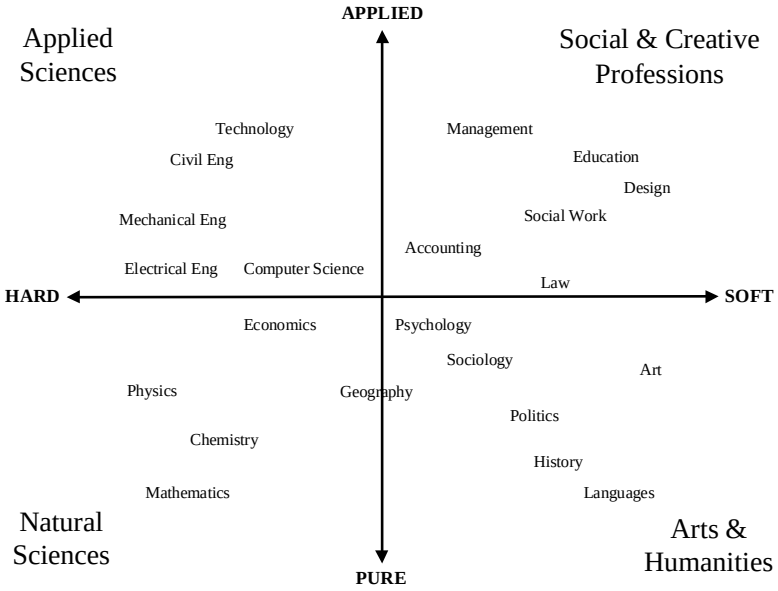

Figure 1: The Biglan Disciplinary Model (Chynoweth 2008)

A number of subsequent studies have tested the validity of the Biglan model. These have demonstrated its ability to effectively distinguish between disciplines (Lattuca and Stark 1995) and it now has general currency amongst higher education researchers (Braxton and Hargens 1996).

The Built Environment Knowledge Base

The precise boundaries of the built environment subject are not fixed but Griffiths (2004) has described it as “a range of practice-oriented subjects concerned with the design, development and management of buildings, spaces and places”. The relevant UK Research Assessment sub-panel defines the field as including “architecture, building science and engineering, construction, landscape and urbanism” (HEFCE 2005).

It will be seen that each of these definitions describes the field in terms of its various fields of application, rather than by attempting to define its cognitive base. This is entirely appropriate for an applied field but it does mean that the various descriptions fail to provide a basis for understanding the nature of its knowledge base. In order for this to be achieved it is first necessary to understand the nature of the work actually undertaken by its academic community and the particular fields of expertise which are employed by its scholars.

The curriculum content of built environment undergraduate programmes provides an indication of the relevant areas of expertise. A further indication is provided by the UK Quality Assurance Agency’s subject benchmark statements within the various fields of application

identified above (for example, QAA 2002). The Royal Institution of Chartered Surveyors has also defined its academic base by reference to particular areas of knowledge (RICS 1991).

Although there are inevitably minor differences in the various descriptions, a degree of consensus is seen to emerge regarding the substantive areas of built environment knowledge. For the purpose of this paper, these are defined in terms of the following five subject disciplines: Management, Economics, Law, Technology and Design.

The predominantly applied nature of the field's knowledge base can be illustrated by locating these areas of knowledge within the Biglan model (Figure 2). This exercise also highlights the enormous diversity of academic practices within the built environment which are seen to span almost the entire spectrum of the arts and sciences. This latter point raises questions as to whether it is appropriate to describe the field as an academic discipline at all, or whether it is simply an amalgamation of disciplines which collectively serve the fields of application identified above.

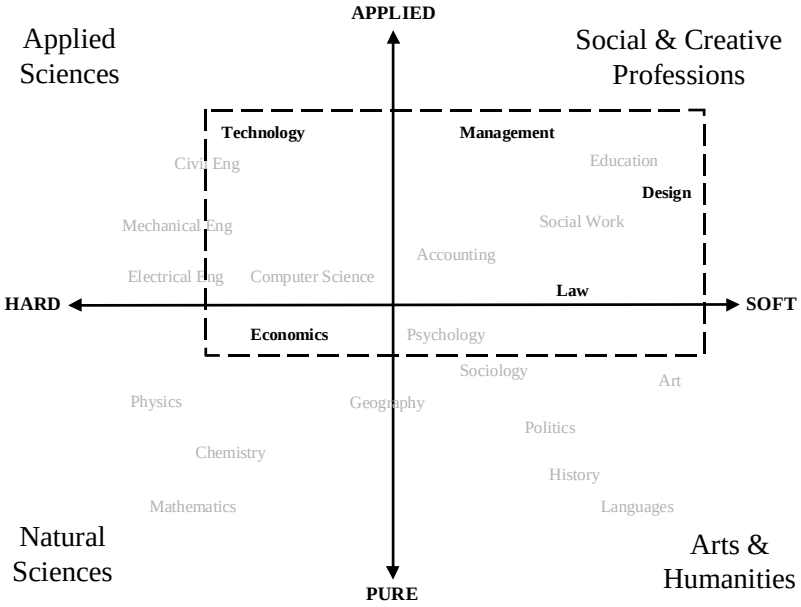

Figure 2: The Built Environment Knowledge Base (Chynoweth 2005)

Disciplinarity and Interdisciplinarity

The term "discipline" is often used loosely to describe the built environment field to reflect the fact that it has now acquired a distinct cultural identity in terms of its academic practices and modes of discourse. However, academic disciplines are not simply social, but also epistemic communities sharing a unified knowledge domain (Becher & Trowler 2001).

The built environment field is not therefore a discipline in the strict sense. However, a related question is whether it could instead be classified as *interdisciplinary* in character. Although frequently also described in this way the term once again tends to be used loosely, often simply to acknowledge that the field is too diverse to be described as an academic discipline in its own right.

The term “interdisciplinarity” is notoriously misunderstood (Moran 2002). Nevertheless, there is now a significant body of scholarship within the subject area, including Jantsch’s (1972) frequently cited taxonomy of interdisciplinarity.

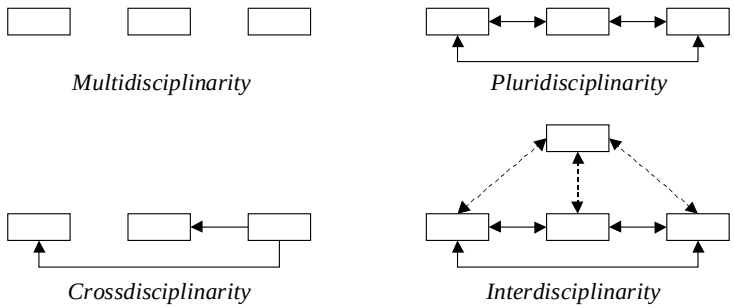

Figure 3: Taxonomy of Interdisciplinarity (Jantsch 1972)

Jantsch draws a distinction between true *interdisciplinarity* and the lesser concepts of *multidisciplinarity*, *pluridisciplinarity* and *crossdisciplinarity* (Figure 3). Multidisciplinarity occurs where a variety of disciplines are encountered simultaneously in circumstances where the possible relationships between them are not made explicit. Klein (1990) notes that this is frequently associated “with undergraduate courses that present different specialists either in serial fashion or on different days”. In a research context multidisciplinarity may be encountered where scholars from different disciplines use the same library or laboratory facilities. The concept is therefore *additive* rather than *integrative* with any synthesis occurring as a matter of accident rather than design (Klein 1990).

The first step towards integration involves a state of *pluridisciplinarity*. This requires the deliberate juxtaposition of different disciplines so as to enhance the relationships between them. Communication between disciplines is encouraged but not coordinated and the nature of any integration is therefore, once again, largely a matter of chance. In contrast, *crossdisciplinarity* introduces an element of coordination into the relationship between disciplines. However this occurs where one discipline imposes its own disciplinary concepts and goals (referred to by Jantsch as *axiomatics*) on the others by force. Therefore, although coordination is present there is an absence of dialogue and the relationship is more about control then cooperation. Jantsh suggests that most claims to interdisciplinarity are at best pluri or cross-disciplinary in nature.

True *interdisciplinarity* only occurs where a number of separate disciplines surrender their own axiomatics and collectively define themselves by reference to a common strategic axiomatic. According to Jantsch this takes place where the traditional disciplines of knowledge are brought together in structures which reflect “basic themes of society or need areas” rather than their own disciplinary identities. The existence of a common axiomatic then facilitates epistemological integration as the disciplines collectively address the resolution of common problems. Where this occurs a new hybrid form of knowledge is created which is usually referred to as an *interdiscipline* (Klein 1990).

If this taxonomy is applied to the built environment it can be seen how the field is, at least potentially, interdisciplinary in character. The extent to which it genuinely achieves this will depend on the degree to which it is able to define its (practical) field of application in terms of a (theoretical) common axiomatic. It will also depend on the extent to which its component disciplines are prepared to subjugate their own disciplinary axiomatics in favour of collective strategic goals, and to work with each other in achieving them.

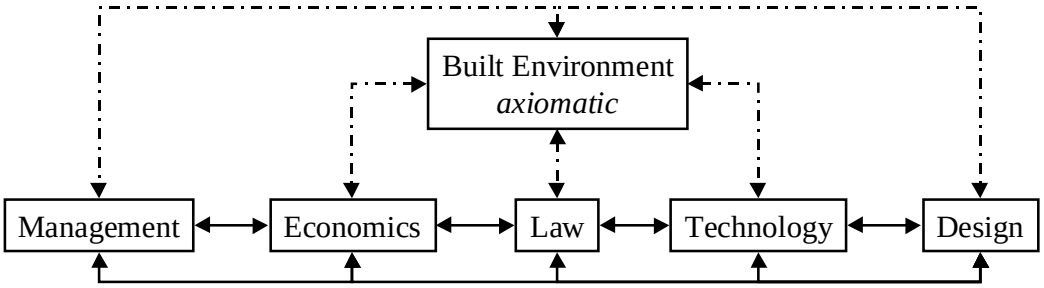

Figure 4: The Built Environment Interdiscipline (after Jantsch 1972)

Jantsh cites architecture and urban and regional planning as examples of fields that “have developed half way” towards genuine interdisciplinarity. The concept of a built environment *interdiscipline* (Figure 4) therefore appears to be a realistic aspiration for the field as a whole. It would also provide a framework around which the subject’s long-neglected theoretical base could be developed. By generating a better understanding of the relationship between the field’s common axiomatic and its individual subject areas it is suggested that decision makers would then be better able to address a range of issues that frequently arise within built environment education. Three of these are briefly described below.

Particular Issues

Curriculum design

The first issue relates to the question of curriculum design. Because the field consists of a number of component disciplines the challenge is to ensure that these are sufficiently integrated and that students receive more than what Klein (1990) has described as a

"cafeteria-style" educational experience. This integration is more likely to be achieved where the educational institution has a well developed understanding of the field's common axiomatic, and where there is therefore genuine interdisciplinary working between academic staff with responsibility for the particular components of the programme.

Whilst this may be achieved in some institutions it seems likely that most students' experiences are, at best, pluridisciplinary. This is illustrated by Hutchinson's (2005) description of law provision within a number of UK built environment institutions. He describes a "traditional" pattern of subject content, teaching methods and assessment which appear to differ little from the treatment of law in any other subject context. No evidence of integration with other subjects was recorded and law subjects were described as being "very largely delivered in exclusively, wholly legal, modular boxes".

The prevailing axiomatic was clearly that of the law discipline. Indeed, it is difficult to see how this could have been otherwise when a significant number of the law subjects were reported as being provided by service teaching by academics from law departments. Curriculum design may therefore be one area in which the field can benefit from the interdisciplinary model and the proper development of a common built environment axiomatic.

Research strategy

The same process is also likely to improve the relevance of academic research within the built environment. This should ideally be capable of delivering solutions to stakeholders within the field across the whole range of its sub-disciplines. A clear sense of its common axiomatic would assist the field in utilising all parts of its knowledge base towards this common end. Unfortunately the field's academic research community is still not "sharing a common journey" with its stakeholders (Brandon 2002).

One aspect of this may be the process of "epistemic drift" (Elzinga 1985) which occurs where the availability of research funding encourages research in some areas to the detriment of that in others. There is evidence that this has occurred in the built environment with the growth of research in management subject areas at the expense of that in technology (Brandon 2002). Research in the law subject area has been similarly neglected, again to the detriment of stakeholders within the field (Chynoweth 2005).

In recent years the field has therefore seen the increasing dominance of the management discipline within built environment research and the development of a strong Management-led crossdisciplinarity. Despite the strength of the pressures which have contributed to this trend it is likely that a clearer sense of interdisciplinary identity could encourage a more evenly balanced approach to research in future years.

The research-teaching nexus

The final issue concerns what has become known as the research-teaching nexus, or the extent to which a university's research genuinely contributes to the effectiveness of its teaching activities. Griffiths (2004) has explained how this is particularly difficult to achieve in

the built environment due to the differing expectations of the teaching and research components of the field.

He describes a professional "content coverage" mentality to curriculum design which reinforces Hutchinson's (2005) findings about the nature of law provision. This does not fit easily with the wider, and more opportunistic, subject content of much built environment research in the management field. The result is an increasing gulf between the areas addressed by the field's research and its teaching activities.

The problem arises from a conflict of axiomatics. To some extent the field's teaching activities are still driven by the axiomatics of the professional disciplines from which it has emerged, or at least by the academic axiomatics of its various component disciplines. However, as discussed above, its research activities are dominated by an axiomatic that has more in common with the management discipline than with the built environment as a whole. It seems therefore that the evolution of an effective research-teaching nexus might also benefit from the development of a common built environment axiomatic.

Conclusions

This paper has noted the lack of a recognised theoretical disciplinary base for the built environment subject area. It has suggested how this might be addressed within the context of the historical and theoretical approaches to knowledge categorisation. It has explored a number of these approaches and identified the common themes on which they are based. It has described these in terms of the unity of disciplinary knowledge and the twin distinctions between the pure and applied, and the artistic and scientific disciplines.

The paper has described the cognitive nature of the built environment knowledge base by reference to the Biglan model which incorporates each of these themes. It has demonstrated how this knowledge base incorporates a number of separate disciplines with diverse epistemologies from across the spectrum of the arts and sciences. It has concluded that the built environment field is not therefore a discipline in the true sense of the word but has explored the possibility that it might nevertheless constitute an *interdiscipline*.

Using Jantsch's taxonomy the paper has concluded that the field does not presently satisfy the definition of *interdisciplinarity*. Whilst it is certainly multidisciplinary its teaching activities are more correctly described in terms of *pluridisciplinarity* whilst its research is indicative of Jantsch's definition of *crossdisciplinarity*. Nevertheless, the paper has proposed the concept of a built environment *interdiscipline* is a realistic aspiration, and one which offers a starting point for the development of a theoretical base for the field as a whole.

It has been suggested that this would provide practical benefits for decision makers when dealing with a number of areas, including curriculum design, research strategy and the management of the research-teaching nexus. However, in accordance with Jantsch's taxonomy, the essential prerequisite for all these changes is the development by the Built Environment academic community, of a common epistemological *axiomatic*.

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